

The GENTLEMAN and LADY'S
PALLADIUM,

For the Year of our LORD, 1762.

CONTAINING,

(Besides what is annual and usual)

Perpetual TABLES for Old and New Style. A NEW METHOD of determining the LONGITUDE from the Royal Observatory at Greenwich. An Account of the late Transit of VENUS over the SUN. With the Dimensions of the Solar System. The most universal, easy, and methodical Solution of the Keplerian PROBLEM. New IMPROVEMENTS in Astronomy and Navigation.

The Fourteenth Number published.

By the AUTHOR of the Royal ASTRONOMER and NAVIGATOR.



Wale inv et del.

J. H. Müller sc.

The Royal happy PAIR, — great in themselves,
They smile superior; — of external Shew
Regardless, while their inbred Virtues give
A Lustre to their Pow'r, and grace their Court
With real Splendor; far above the Pomp
Of Eastern Kings, in all their Tinsel Pride.

SOMERVILLE'S Chace.

L O N D O N :

Printed for G. KEITH, at the Bible and Crown, in Grace-church
Street. M.DCC.LXII.

A TABLE for reckoning the Value of **INTEREST**, other *Income*, or *Wages*,
[2] for any Number of Days, according to their yearly Value.

Per Yr.	Per Day.					Y.	Per Day.				
L.	L.	s.	d.	q.	C.	L.	L.	s.	d.	q.	C.
900000	2465	15	0	3	28	900	2	9	3	3	12
800000	2191	15	7	1	59	800	2	3	10	0	11
700000	1917	16	1	3	39	700	1	18	4	1	09
600000	1643	16	8	2	19	600	1	12	10	2	08
500000	1369	17	3	0	49	500	1	7	4	3	07
400000	1095	17	9	2	79	400	1	1	11	0	05
300000	821	18	4	1	09	300		16	5	1	04
200000	547	18	10	3	40	200		10	11	2	02
100000	273	19	5	1	70	100		5	5	3	01
90000	246	11	6	0	33	90		4	11	0	72
80000	219	3	6	2	96	80		4	4	2	41
70000	191	15	7	1	59	70		3	10	0	11
60000	164	7	8	0	22	60		3	3	1	81
50000	136	19	8	2	85	50		2	6	3	50
40000	109	11	9	1	48	40		2	2	1	21
30000	82	3	10	0	11	30		1	7	2	91
20000	54	15	10	2	74	20		1	1	0	60
10000	27	7	11	1	37	10			6	2	30
9000	24	13	1	3	24	9			5	3	67
8000	21	18	4	1	09	8			5	1	04
7000	19	3	6	2	96	7			4	2	41
6000	16	8	9	0	82	6			3	3	78
5000	13	13	11	2	69	5			3	1	15
4000	10	19	1	0	55	4			3	2	52
3000	8	4	4	2	41	3			1	3	89
2000	5	9	7	0	27	2			1	1	26
1000	2	14	9	2	14	1				2	63

But one Year's Interest of any Sum is always equal to the Hundredth Part of the Product of that Sum multiplied by the Rate per Cent. Which Interest is always found by cutting off 2 Figures to the Right Hand.

EXAMPLE IV. Required the Interest for a Year of 365 Pounds at 4 per Cent?

365 } **EXAMPLE V.** Required 64 Days Interest of 365 l.
4 }
14,60 }
£. 14.12^s }
Answer per 584 }
Year. 876 }
934.4 }
Answer.

So for any other Reckoning of Days, according to the Value by the Year.

EXAMPLE I.

What is the Income of 100 l. a Year, per Day?
Against 100 l. to the Right, you find 5 s. 5 d. 3 q. 01 per Day.

EXAMPLE II.

What is a yearly Income of 321 l. per Day?
l. s. d. q.
Agt. 300 . . . 16 5 1,04
20 . . . 1 1 0,60
1 . . . 2,63
321 . . . 17 7 0,27
Answer.

Now, since every yearly Income corresponds with its daily Income; therefore, any Number of Days Income to any yearly Salary will be the same as a Day's Income to that Salary, taken as many Times as there are Days to be reckoned for, according to the first yearly Income. That is, 10 Days at 10 l. a Year come to the same as 1 Day at 100 l. a Year.

EXAMPLE III.

Required the Value of 96 Days Wages at 10 l. a Year; being the same as 1 Day's Wages at 96 Times 10 Pounds a Year, or 960 l. a Year?
l. s. d. q.
Agt. 900 . . 2 9 3 3,12
60 . . 3 3 1,81

960 . . 2 12 7 0,93
Answer.
Consequently if you know the Interest for a Year of any Sum, you may find the Interest thereof for any Number of Days, by the like Rule of multiplying the Year's Interest by those Days.



New

New Table for finding the Dom. Let. for ever, N. S. Week and Month-Day Table.

Dom. Letters for *Gregorian* or *N. S.* since *Christ.*

YEARS above CENTURIES since CHRIST.	Centuries since <i>Christ.</i>				YEARS above CENTURIES before CHRIST.
	2800	2900	3000	3100	
	2400	2500	2600	2700	
	2000	2100	2200	2300	
	1600	1700	1800	1900	
	1200	1300	1400	1500	
	800	900	1000	1100	
	400	500	600	700	
	0	100	200	300	

This Do. Letter . . . BA C E G revolves in 400 Yrs.

1	29	57	85	G	B	D	F	16	44	72	100
2	30	58	86	F	A	C	E	15	43	71	99
3	31	59	87	E	G	B	D	14	42	70	98
4	32	60	88	DC	FE	AG	CB	13	41	69	97
5	33	61	89	B	D	F	A	12	40	68	96
6	34	62	90	A	C	E	G	11	39	67	95
7	35	63	91	G	B	D	F	10	38	66	94
8	36	64	92	FE	AG	CB	ED	9	37	65	93
9	37	65	93	D	F	A	C	8	36	64	92
10	38	66	94	C	E	G	B	7	35	63	91
11	39	67	95	B	D	F	A	6	34	62	90
12	40	68	96	AG	CB	ED	GF	5	33	61	89
13	41	69	97	F	A	C	E	4	32	60	88
14	42	70	98	E	G	B	D	3	31	59	87
15	43	71	99	D	F	A	C	2	30	58	86
16	44	72	100	CB	ED	GF	BA	1	29	57	85
17	45	73		A	C	E	G		28	56	84
18	46	74		G	B	D	F		27	55	83
19	47	75		F	A	C	E		26	54	82
20	48	76		ED	GF	BA	DC		25	53	81
21	49	77		C	E	G	B		24	52	80
22	50	78		B	D	F	A		23	51	79
23	51	79		A	C	E	G		22	50	78
24	52	80		GF	BA	DC	FE		21	49	77
25	53	81		E	G	B	D		20	48	76
26	54	82		D	F	A	C		19	47	75
27	55	83		C	E	G	B		18	46	74
28	56	84		BA	DC	FE	AG		17	45	73

Exam. fin. Cb.	B	D	F	G	Exam. bef. Cb.
Under 1700	300	200	100	0	Above 1700
& against 62,	700	600	500	400	& against 62,
stands C, the	1100	1000	900	800	stands F, the
Dom. Let. for	1500	1400	1300	1200	Dom. Let. for
1762, fin. Ch.	1900	1800	1700	1600	1762, bef. Ch.
N. S. Yrs.	2300	2200	2100	2000	N. S. Yrs.
GF b. Cb. 585	2700	2600	2500	2400	G f. Cb. 2001
6 X 400 2401	3100	3000	2900	2800	7 X 400 2801
GF f. Cb. 1816	Centuries bef. Christ.				G b. Cb. 800

Dom. Letters for *Gregorian* or *N. S.* bef. *Christ.*

Week and Month-Day Table.

Mths.	Sunday Letters.						
	A	B	C	D	E	F	G
Jan. 31	1	2	3	4	5	6	7
Oct. 31	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	1	2	3	4
Feb. 28	5	6	7	8	9	10	11
Mar. 31	12	13	14	15	16	17	18
Nov. 30	19	20	21	22	23	24	25
	26	27	28	29	30	31	1
	2	3	4	5	6	7	8
Apr. 30	9	10	11	12	13	14	15
Jul. 31	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31	1	2	3	4	5
	6	7	8	9	10	11	12
Aug. 31	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31	1	2
Sep. 30	3	4	5	6	7	8	9
Dec. 31	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	31	1	2	3	4	5	6
	7	8	9	10	11	12	13
May 31	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31	1	2	3
	4	5	6	7	8	9	10
Jun. 30	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	

U S E.

Under the Dominical Letter, and against the Month, are the *Sundays* and the *Week Days* to the Right and Left.

EXAMPLE.

To find the Week-day to June 13, 1763, N. S.

Under the Dominical Letter B, against *June*, the *Sundays* are 5, 12, 19, 26; and the 13th is on *Monday*.—The same to be observed for the Dominical Letter O. S.

[4] NEW TABLE for finding the *Dominical Letter* for ever, at Sight, O. S.
 DOMINICAL LETTERS for *Julian*, or Old Style, since CHRIST.

YEARS above CENTURIES since CHRIST.				CENTURIES since CHRIST.								YEARS above CENTURIES before CHRIST.			
				3500	3600	3700	3800	3900	4000	4100					
				2800	2900	3000	3100	3200	3300	3400					
				2100	2200	2300	2400	2500	2600	2700					
				1400	1500	1600	1700	1800	1900	2000					
				700	800	900	1000	1100	1200	1300					
				0	100	200	300	400	500	600					
This Dom. Letter				DC	ED	FE	GF	AG	BA	CB	revolves in 700 Ys.				
1	29	57	85	B	C	D	E	F	G	A	16	44	72	100	
2	30	58	86	A	B	C	D	E	F	G	15	43	71	99	
3	31	59	87	G	A	B	C	D	E	F	14	42	70	98	
4	32	60	88	FE	GF	AG	BA	CB	DC	ED	13	41	69	97	
5	33	61	89	D	E	F	G	A	B	C	12	40	68	96	
6	34	62	90	C	D	E	F	G	A	B	11	39	67	95	
7	35	63	91	B	C	D	E	F	G	A	10	38	66	94	
8	36	64	92	AG	BA	CB	DC	ED	FE	GF	9	37	65	93	
9	37	65	93	F	G	A	B	C	D	E	8	36	64	92	
10	38	66	94	E	F	G	A	B	C	D	7	35	63	91	
11	39	67	95	D	E	F	G	A	B	C	6	34	62	90	
12	40	68	96	CB	DC	ED	FE	GF	AG	BA	5	33	61	89	
13	41	69	97	A	B	C	D	E	F	G	4	32	60	88	
14	42	70	98	G	A	B	C	D	E	F	3	31	59	87	
15	43	71	99	F	G	A	B	C	D	E	2	30	58	86	
16	44	72	100	ED	FE	GF	AG	BA	CB	DC	1	29	57	85	
17	45	73		C	D	E	F	G	A	B		28	56	84	
18	46	74		B	C	D	E	F	G	A		27	55	83	
19	47	75		A	B	C	D	E	F	G		26	54	82	
20	48	76		GF	AG	BA	CB	DC	ED	FE		25	53	81	
21	49	77		E	F	G	A	B	C	D		24	52	80	
22	50	78		D	E	F	G	A	B	C		23	51	79	
23	51	79		C	D	E	F	G	A	B		22	50	78	
24	52	80		BA	CB	DC	ED	FE	GF	AG		21	49	77	
25	53	81		G	A	B	C	D	E	F		20	48	76	
26	54	82		F	G	A	B	C	D	E		19	47	75	
27	55	83		E	F	G	A	B	C	D		18	46	74	
28	56	84		DC	ED	FE	GF	AG	BA	CB		17	45	73	
Example since Christ.				C	D	E	F	G	A	B	Ex. bef. Ch. Above				
Under 1700 & agt 62				600	500	400	300	200	100	0	1700 & agt 62 stands				
stands F, the Do. Let. for				1300	1200	1100	1000	900	800	700	G, the Do. Let. for				
1762, fin. Chr. O. S.				2000	1900	1800	1700	1600	1500	1400	1762, bef. Ch. O. S.				
E. b. Chr. 1766 = 1766				2700	2600	2500	2400	2300	2200	2100	D fin. Ch. = 1769				
1 + 5 times 700 = 3500				3400	3300	3200	3100	3000	2900	2800	1 + 3. 700 = 2101				

E. *fin. Ch.* Comp. 1736. CENTURIES before CHRIST. D. *bef. Ch.* comp. 1732
 DOMINICAL LETTERS for *Julian*, or Old Style, before CHRIST.

By the Nature of Notation, 0 Year *fin. Chr.* answers to 1 Year *bef. Christ*; and 0 Year *bef. Christ* answers to 1 Year in or *fin. Chr.* According to which new Improvement the above chronological Table is founded. So that 1, 101, 201, 301, &c. Years *bef. Christ*, are Leap Years: as are 3, 9, 13, &c. after those.

GOLDEN NUMBERS, at Sight, for any Year before or since CHRIST. [5]

In every 19 Hundred Years the Golden Number revolves; being the same for Old or New Style.	Years above Hundreds before Christ.																		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77
	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58
	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39

Bef. Chr.	Sin. Chr.	Years above Hundreds since Christ.																		
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
		19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
		38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56
		57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75

Golden Numbers before and since Christ.																				
42	23	4	0	19	38	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
41	22	3	1	20	39	6	7	8	9	10	11	12	13	14	15	16	17	18	19	1
40	21	2	2	21	40	11	12	13	14	15	16	17	18	19	1	2	3	4	5	6
39	20	1	3	22	41	16	17	18	19	1	2	3	4	5	6	7	8	9	10	11
38	19	0	4	23	42	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
37	18	9	5	24	43	7	8	9	10	11	12	13	14	15	16	17	18	19	1	2
36	17	8	6	25	44	12	13	14	15	16	17	18	19	1	2	3	4	5	6	7
35	16	7	7	26	45	17	18	19	1	2	3	4	5	6	7	8	9	10	11	12
34	15	6	8	27	46	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
33	14	5	9	28	47	8	9	10	11	12	13	14	15	16	17	18	19	1	2	3
32	13	4	10	29	48	13	14	15	16	17	18	19	1	2	3	4	5	6	7	8
31	12	3	11	30	49	18	19	1	2	3	4	5	6	7	8	9	10	11	12	13
30	11	2	12	31	50	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
29	10	1	13	32	51	9	10	11	12	13	14	15	16	17	18	19	1	2	3	4
28	9	0	14	33	52	14	15	16	17	18	19	1	2	3	4	5	6	7	8	9
27	8	9	15	34	53	19	1	2	3	4	5	6	7	8	9	10	11	12	13	14
26	7	8	16	35	54	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
25	6	7	17	36	55	10	11	12	13	14	15	16	17	18	19	1	2	3	4	5
24	5	6	18	37	56	15	16	17	18	19	1	2	3	4	5	6	7	8	9	10

EXAMPLE. To find the Golden Number for 1782. since or before Christ?

Against 17 Hundred } since { Christ } stands { 16 } for
and under 82 . . } before { } Answer.

Golden Number 16, since Christ, 1782 —

1 + once 1900 . . . 1901

16 . . before Christ . . 119

Viz. Any Number of Years, before or since Christ, being taken from 1 added to any Number of 1900 Years, will give the Year since or before Christ, having the same Golden Number.

NEW

The GENTLEMAN and LADY'S

NEW ÆNIGMAS.

I. ÆNIGMA 114. By Mr. Nath. Cory, of Harpole.

YE *Beaux* and *Belles* — Ænigmatists attend,
And serve, for once, your most obliging Friend;
To all you ask I ready Answer give,
And though still changing, never once deceive;
On me you often gaze with eager Eyes,
Sometimes with Pleasure — oft to your Surprise.

If you but search, you'll find in *Albion's* Land
My Brethren num'rous as the *Gallie* Band.
And *Heroes* all — in diff'rent Shapes appear,
We face our Foe — who ne'er was in our Rear.

Let Nations jar — War's dire Contagion reign,
I'm ne'er dismay'd, my Station I maintain.
If civil *Discord* fills the Land with Blood,
I still am pointed for the public Good;
Yet ne'er am anxious after Pow'r and Place,
And though no Statesman, yet high Post I grace;
There I'm oblig'd keen *boreal* Blasts to bear,
Yet I bright *Phæbus'* kinder Influence share.
Though much I boast — a *Vassal* still remain,
Take off the Mask — discover now my Name.

II. ÆNIGMA 115. By Mr. G. Hayden of Epforn.

ΖΗΤΕΙΤΕ καὶ εὐχόμετε. Homer.

1. 'ERE Man or Beast Existence had,
A partial Sway I gain'd,
But now completely was I made,
'Ere *Adam* long had reign'd.
2. And now o'er all this earthly Sphere
I ev'ry where abound,
'With distant Objects, and more near,
Continually am found.
3. So high and lofty is my Mien,
That I can Heaven trace,
And yet so vulgar and obscene,
That Hell doth me embrace.
4. Yea Death himself though dire and stern
Does freely yield to me;
By *Kings* and *Heroes* I am worn,
Saluted frank and free.
5. By no Creation was I made,
Did to no Birth arrive;
I no Beginning ever had —
All Ages shall survive!

III. ÆNIGMA 116. By Mr. Tho. Harris, of Bugbrook, near Northampton.

BEFORE the Race of Man I took my Birth,
And since with him I walk about the Earth;
No Mortal could exist without my Aid,
Yet often I have been *supinely* laid.

My Form is various — in each verdant Mead,
Each flow'ry Lawn, and each inviting Shade;
Each purling *Riv'let*, and each mossy Spring,
Where nimble *Naiades* dance, and Muses sing.
On Earth and Sea I'm seen from Pole to Pole,
In boundless Oceans unrestrain'd I roll.
No Coast there is but where my Form is hurl'd,
I sail'd with *Anson* round the spacious World.

Great *Prussia's* Monarch well does know my Name,
Who, by my *Sight*, has gain'd immortal Fame.
Where *British* Cannon thund'ring shake the Air,
With *Gallic* Forces sometimes I appear.
I'm ne'er in Front — yet swiftly I pursue;
When *Heroes* conquer then I am in View.

IV. ÆNIGMA 117. By Mr. Randles of Aldridge School.

TWO Legs I have, but seldom walk on Ground,
Yet when I run or move one Leg turns round.

V. ÆNIGMA 118. By Mr. Thomas Holland, of Marbury.

FROM the dark Caverns of old Mother Earth
I have been torn; so cruel was my Birth:
And still sustain'd more direful Scenes of Woe,
By *Vulcan's* Wrath constrain'd to undergo.
O what Extremes of Fate does pass on me,
Before that I can half completed be;
Art and much Labour form my Parts together,
And being made, I'm both in Wood and Leather.
Ladies, you'll think I have a pow'rful Sway,
Thousands by me have fall'n in one Day.
As fleetest Steeds, who strive the Race to win,
I and my Followers in full Chase have been!
To gain the *End*, they strive with Heart in Hand,
And throw down all — scarce one before them stand!
Though *Thousands* by me oft are *Captives* made,
Yet *Poor* and *Rich* shall court my friendly Aid.
— What *cruel Monsters* horrible and strange,
In Search of Prey o'er *Afric's* Desarts range!
I'm no such Monster of that Savage Kind,
But a true Friend in me you'll always find:
Like *Skeleton*, a meagre Shape I have,
By all I'm deem'd the poor Man's Friend and Slave.
With rustic Clown in Cottage I abide;
But seldom do in *Palaces* reside.
Come tell my Name, and then, *fair Nymphs*, you'll see
A *Rib*, in Likeness, much resembles me.

VI. ÆNIGMA 119. By Mr. William-Swift, of Stow, near Lincoln.

BY Nature I'm strong, yet my Body is small,
 I am hurtful to some, yet am useful to all.
 In the Morning I'm brisk, in the Ev'ning I'm dull,
 And though always am greedy yet always am full.
 In my best of Appearance I'm sparkling and bright,
 I rise with the Day, and I set when 'tis Night.

VII. ÆNIGMA 120. By the same Gentleman.

DEAR Ladies, 'tis less strange than true,
 I'm ready to attend on you;
 I've neither Leg nor Foot to stand
 Yet am your Servant at Command.
 I've ne'er a Head, though Mouth and Eyes,
 At which you never shew Surprise;
 When I appear to make a Show,
 I oft in Gold or Silver go.
 In me the Ladies take Delight,
 Who kiss their Hands at Morn and Night.
 The Food I take, I needs must tell,
 Is very sweet. — Ye Fair, farewell.

VIII. ÆNIGMA 121. By Mr. Hall Bellamy, at Stow School.

THE first of Six, the last of Five,
 I'm neither dead, nor yet alive;
 In Colour I am chiefly dun,
 And could you face the burning Sun,
 Just in the Midst I do appear,
 And Stranger am to Hope or Fear;
 I fly the Old, but herd with Young,
 And join with ev'ry joyous Tongue.
 Nay more — you'll find it certain true,
 I come, behold, and follow you.

IX. ÆNIGMA 122. By Mr. Nath. Cory, of Harpole, near Northampton.

LADIES, I dwell where Fawns and Satyrs rove,
 As oft exist in Regions pure above;
 Alternately my Blessings I dispose,
 When *Sonnus* wooes the Earth in sweet Repose.
 Then, like the *Dryades*, range the trackless Wild,
 But unobserv'd I move serene and mild.
 Without a Fee — attend the sickly Bed,
 Revive the Weak, and raise the drooping Head.
 A Sage of Old — by his express Command,
 I banish'd was from *Is'el's* fertile Land;
 And Earth revolv'd three Times her annual Course
 Ere I appear'd — What hard Restraint or Force!
 For, in my Absence, see each beauteous Fair,
 Assumes a Look of pensive wild Despair.
 When Summer Suns adorn the smiling Year,
 'Tis then my sov'reign Use does most appear;

But

But *bold* — enough is said — now solve my Name,
And be enroll'd within the Lists of *Fame*.

X. ÆNIGMA 123. By Mr. Swift, of Stow.

I live in *that* which all consume,
And there I take my *Rest*;
In what all others find their Doom,
I please my *Fancy* best.

XI. ÆNIGMA 124. By Mr. Tho. Sadler, of Audlem.

ÆNIGMATISTS, come tell the World my Name,
To Man and Beast and Trees my Birth I claim,
Dull and inactive sometimes I appear,
But, put in Motion, breathe a gentle Air.
I give Relief and ease the Lover's Pain,
Should *Susan* prove unconstant to her Swain.
Though oft I'm *flouted* by the Sage and Swain,
Yet Others to admire me don't disdain.
Sometimes to dancing I the Swain invite,
I always am the Hay-Maker's Delight;
And I attended on the Rebel Band,
When those Usurpers did invade this Land:
From Place to Place I range the Country round,
In *Drury-Lane* and *Covent-Garden* found:
Orpheus, like me, as *Ovid* pleas'd to tell,
Once fetch'd the fair *Eurydice* from Hell.
When Lovers meet, I captivate the Mind:
But hold — enough is said my Name to find.

XII. ÆNIGMA 125. By Mr. Tho. Sadler, of Audlem.

DEAR Ladies, at London I always reside,
And in your Apartments I often abide;
Sometimes I'm employ'd to attend on the Great,
On Dukes, Lords, and Commons, I frequently wait.
At *Vauxhall* and *Ranelagh* too I appear,
Or go to the Play-house — I'm sure to be there.
To *Garrick* I'm known, who owns me his Friend,
On *Barry* and *Woodward* I likewise attend.
As spruce a Comedian as any I be,
Can Characters mimick in any Degree.
Behold me, I vary in Colour and Shape,
And different Fashions and Sexes I ape.
Sometimes I'm wrinkled with Age, you must know,
At other Times young, and as fine as a *Beau*;
And Assistance I give to those who delight
In wronging the Ladies of what is their Right:
To *Damon* and *Chloe* I've prov'd so uncivil,
As to make them suppose that I am the *Devil*.
Should *Cerberus* meet with the poor Country Swain
When tripping to *Dorothy* over the Plain,
He would not more frightful than I do appear,
Nor more strike the *Rustic* with Horror and Fear.

By some I am fear'd, and by Others admir'd —
My Name then disclose — *which is all is requir'd.*

XIII. ÆNIGMA 126. *By Mr. Tho. Sadler, of Audlem.*

MY *Orig'nal* first came from Mother Earth,
Though some will say that *Vulcan* gave me Birth.
His furious Wrath, indeed, I have endur'd
Before that I my present Form procur'd.
As to my Shape — I've neither Head or Eyes,
Nor Legs to walk, which cause the more Surprise;
Horns I have got, I on my Belly stand,
Upon my Back an Arm, though ne'er a Hand;
And with a monstrous Aspect I appear,
And mock the Rovers that in Desarts steer.
But conq'ring Men of me a Captive have,
Bound to a Block I'm doom'd to be their Slave;
There I am beat until I roar again,
For Man's Support and his insatiate Gain.
As in his Absence I must always be
His Pris'ner made — such my hard Destiny —
In a dark Dungeon, Ladies you must know,
Of Shoulder Height from Town to Town I go.
Thus I endure such various Scenes of Fate
To make Men wealthy, eminent, and great.

XIV. ÆNIGMA 127. *By Amicus.*

ÆNIGMATISTS, 'tis hard to hide
A Thing so known, and must abide,
To Poor and Rich (e'en Men of Fashion)
In this or any other Nation. —
The Substance, of which I'm combin'd,
Consists of diff'rent Things when join'd;
But mark how Fate hath me decreed,
I am the poor Man's Friend in Need.
When first I lose my pristine State,
By him endure Extremes of Fate.
Down on my Back am forc'd to lie,
Expos'd to ev'ry Stander by.
And some, more furious than the Rest,
Pull Back or Sides as they like best.
'Twixt Earth and Heav'n I have been borne,
And seem'd an Object most forlorn.
With Art and Judgment Men compose
My Shape, althoug' perhaps with Blows,
They oftentimes bestow on me,
Though with a faint Dexterity.
I have been trampled under Foot
By *Damon*, *Sue*, and *Hodge* to boot;
Nay, *Damon* he will make his Boast
That he on me has drank his Toast
Unto each celebrated Fair,
Who constant as the Turtles are,

Erected

Erected high in open Air,
 On sturdy Pillars I appear.
Diogenes within a Tub
 To teach his Pupils kept a Club;
 So I, to keep me safe and free,
 Encircled and surrounded be.
 A while secure, but 'tis not long
 Before I'm cast among the Throng,
 Who me devour. — But hold, ye Fair,
 My Name with Ease you may declare.

XV. *ÆNIGMA Latinum*, 128. *A Mariâ Willeter, de Epsom.*

Denique dic, ex quâ primo speramus in anno

Quo servitur, fruges, arbore? Phœbus eris.

*** *Whosoever sends the best Answers to the following Ænigma before Candlemas next, will be intitled by Lot to 4, 3, and 2 Palladiums, to be delivered in London according to Direction.*

PRIZE-ÆNIGMA. By Mr. Tho. Harris, of Bugbrook.

WHEN radiant Sol adorns the Eastern Sky,
 And gilds each neighb'ring Cloud with beauteous Dye;
 Or sable Night expands her Gloom around,
 I in aerial Climes am always found:
 Or, when dread *Jove* his Thunder makes to roll,
 Or nipping *Boreas* hovers round the Pole,
 Or monstrous *Goblins* take their nightly Round,
 No Shelter for my guiltless Head is found.
 Though Hardships I for Sake of Strangers bear,
 Yet none for me in Pity sheds a Tear.
 Our Race as num'rous as the Stars above,
 That deck yon azure spangled Fields of *Jove*.
 — Were I but Half my *Miracles* to shew,
 You'd think I sprung from the *infernal* Crew;
 For furious Lions unconcern'd I meet,
 And lay the *Dragon* bleeding at my Feet;
 Attract the brilliant Stars within the Sky,
 And make pale *Cynthia* from her Orbit fly.
 Thousand such Feats as these I could relate,
 Yet calm my Disposition and sedate —
 Nay more you'll find — some worthy *Heroes* slain,
 My magic Power will make appear again;
 Now gain the Prize and tell the World my Name,
 And stand recorded in the Book of Fame.

THE QUERIST.

NEW QUERIES.

I. QUERE 132. *By Mr. Swift, of Stow.*

WHAT was the Avoirdupoize and Troy Weight of *Abalom's* Hair according to Scripture, (2 Sam. xiv. Ch. 26 Ver.) which he yearly potted?

II. QUERE 133. By Mr. Geo. Hayden, of Epsom.
SAY why the Sun arrays with *shining Dyes*
The gaudy *Bow* that gilds the gloomy Skies.

Broome.

III. QUERE 134. By Mr. Swift, of Stow.
WHY all Things appear inverted in the Water?

IV. QUERE 135. By Mr. John Knowles, of Epsom.
WE read of the *Torpedo*, or *Cramp-Fish*, which being touched
with the Finger when taken out of the Water, causes a *Sensation*
very much like the Cramp in the Person who touches it; and
gives the same Person a Shock as *instantaneous* as Electricity.
What is the Reason assigned for this uncommon Effect?

V. QUERE 136. By the Same.

WHICH is the more easy to resist, *Pleasure* or *Pain*?

VI. QUERE 137. By Mr. W. Williams, of Hackney.
WHAT is *Light*?

VII. QUERE 138. By the Same.
WHAT is meant by *Tradux Animæ*?

VIII. QUERE 139. By the Same.
WHEREIN does Man's Free-Agency consist?

IX. QUERE 140. By Mr. G. Haydon, of Epsom.
WHAT is *Space*?

X. QUERE 141. By Mr. Alexander Rowe.
MR. Pope says, in his *Essay on Man*,

Let's catch the Manners living as they rise.

— What is meant by those Words?

XI. QUERE 142. By Mr. Hams, of Bugbrook.
WHY do the fixed Stars appear steady and not sparkle through
a Telescope, or Piece of printed Paper?

XII. QUERE 143. By Amanda.
WHENCE came the Title of *Father in God*, given to our
Right Reverend Prelates?

XIII. QUERE 144. By Mr. Alexander Rowe, at Regennis, in
Cornwall.

THE Writers on *Fluxions* say, that if any Quantity is a *Maximum* or *Minimum*, that Quantity being multiplied or divided by
any known Quantity, the Product or Quotient will be also a
Maximum or *Minimum*. — Then, if any known Quantity be
added to, or subtracted from it, will the Sum or Difference be
also a *Maximum* or *Minimum*?

*** Whoever sends true Answers to the following Quere by Candelmas next, has a Chance, by Lot, for 4 and 2 Palladiums, which will be delivered in London, according to their Directions given.

PRIZE QUERE. By Mr. W. Williams, of Hackney.

IN what Year current before Christ did Solomon keep the great
Feast for the Dedication of the Temple, which lasted eight Days?
And on what Days of the Week were the first and the last Days
thereof, according to both Old and New Style?

NEW

NEW REBUSES.

I. REBUS. By Mr. Robert Dallinger, at Witham, in Essex.

1. Take a *Thing* that's a Mixture of both Beast and Bird,
And what we a *base Villain* call,
And take an *Expression* that by us is us'd,
When we into Danger do fall.

2. A *Liquor* that cheers and enlivens our Souls,
And a *God* which rules over the Main;
The *Initials* of these, when join'd, will declare
A *Last* I would gladly obtain.

II. REBUS. By Mr. J. Knowles, of Epfom.

Omnia vincit Amor. Virgil.

TAKE the Name of a *Wood* of great Use to this Nation,
With the Part of a *Swine* that's in great Reputation;
Both these join'd together will plainly impart,
Where lives the *dear Nymph* that rules over my Heart.

III. REBUS. By Mr. Will. Swift, at Stow.

WHAT *Roger* pretends when he *smiles* on his *Kitty*,
And tells her *fine Things* — that she's wond'rous pretty;
If you add her *Denial* revers'd — you will find
A Part of this *Subject*, and Part of her Mind.
If at *Cards* you should play — add a *Game* — it will tell
The *Town* where lives *Kitty* — to Fame known so well.

NEW PARADOXES.

I. PARADOX. By Mr. Swift, of Stow.

GOOD Morrow, Friend *Roe*, and your Wife also,
Or your suppos'd Wife rather;
No, No, by my Life, she is none of my Wife,
My Father begot her *Father*.

II. PARADOX. By Miss in her Teens.

I am born every Year, yet am 14 Years old.

NEW QUESTIONS.

I. QUESTION 203. By Mr. Thomas Holland, of Marbury.

THREE Maidens Ages if you'd know,
They are express'd in Terms below.
Each Age by th' Sum of th' other two,
Being multiplied, these *Products** shew.
From hence, ye *Analysts*, discover,
Each Fair One's Age — fit for a Lover.

* 504, 544, 600.

II.

II. QUESTION 204. *By the Same.*

A Gentleman intends to make a small *Island*, in Form of a geometrical Square, whose Sides shall be 320 Feet, to be surrounded with a *Canal* to be sunk 12 Feet in Depth; so that the Earth flung up out of the surrounding *Canal* may raise the *Island* 3 Feet upon its Surface. On which *Island* thus elevated he would plant a Grove of Trees with 13 Trees in 16 Rows, and 3 Trees in each Row. Required the Breadth of the *Canal* and Form of Planting the Trees?

III. QUESTION 205. *By Miss Peacock, of Oxfordshire.*

IF 500 Sheep are folded with a hundred Hurdles, required the least Number of Hurdles it will take to fold 1000 Sheep?

IV. QUESTION 206. *By Mr. Edward Kimpton, of Barkway.*

BEING sent for to survey a *Field*, in Form of a rectangular Triangle ABC, right-angled at A, I found the three Sides thereof overflown with Water. But three Trees standing at the Corners of the Field, and there being two high Banks for Foot Paths, both issuing at right Angles from the Ends of the Field's longest Side BC, I went to work as follows. I measured along the Foot-Path from B to D, equal 8 Chains 48 Links, (according to *Gunter's Chain*) when I observed I was in a direct Line with two Trees A and C. Then I measured from C, along the Foot-Path 12 Chains 48 Links to E, when I saw myself in a direct Line with the other Side of the Field AB. From whence the Sides and Content of this triangular Field are required?

V. QUESTION 207. *By the Same.*

IN Latitude 54° North is a *Town*, and in Latitude 64° North a *Mountain*, both under the same Meridian, at both which Places, on the 21st of *December*, the Sun has been observed to rise at the same Moment of Time. Required from thence the Height of the *Mountain*?

VI. QUESTION 208. *By Mr. Alexander Rowe, at Reginnis, near Penzance, Cornwall.*

AN Architect bought a Piece of Timber, in Form of a *Cylinder*, for which he gave at the Rate of two Shillings per Foot. Now upon working up the Piece he found the Dimensions such that it would cost him more Money than had they been any other; the diagonal Line being 8 Feet. Whence the Solidity of the Timber and what it cost are required.

VII. QUESTION 209. *By Mr. Randles, at Aldridge-School, Staffordshire.*

REQUIRED the Latitude North, where the Length of the shortest Day and Length of *Twilight* are both equal?

VIII. QUESTION 210. *By Mrs. ANNE NICHOLLS, of Hadham, Hertfordshire.*

SAILING from the Latitude 47° North, between the South and West Points of the Compass, 400 Miles, and finding the Difference of Longitude and Latitude to be equal; required from thence the Course steered?

IX. QUESTION 211. *By the Same.*

GIVEN the Area of a right-angled Triangle equal to 10 Chains, a = the Base, and x = the Perpendicular, the Sides of the Triangle are from thence required, when $a^2 = 100$?

X. QUESTION 212. *By Mr. Alexander Rowe.*

GIVEN the Solidity = 140040.84128, and the convex Surface = 13741.1974 of a prolate Spheroid, to find from thence its Dimensions and Solidity of the greatest Cone that can be inscribed therein.

XI. QUESTION 213. *By Mr. Paul Sharp, of Biddenden, Kent.*

THE *Abscissa* of a common Parabola is to its bounding Semi-ordinate as 3 to 4, and the Curve thereof is equal to the Area of its greatest inscribed Parallelogram: To determine from thence the Area of the Parallelogram and greatest inscribed Parallelogram by a simple Equation.

XII. QUESTION 214. *By the Same.*

THE Axis and Diameter of the Base of the least parabolic Conoid that will circumscribe any Sphere are equal to $\frac{4}{3}$ of the Sphere's Diameter, and the Parameter of the generating Parabola = $\frac{1}{3}$ of the said Diameter: Moreover, the Solidity of the Sphere is to the Solidity of the Conoid, as 1 to $\frac{16}{9}$: Required the Demonstration.

XIII. QUESTION 215. *By Mr. John Thomson, of Witherby Bridge, Leicestershire.*

IN a right-angled Triangle ABC, is given the Base AC = 40, Perpendicular AB = 20; required the greatest Parallelogram that can be inscribed in the Space made by the Segments of the Hypotenuse, Base, and inscribed Circle?

XIV. QUESTION 216. *By the same Gentleman.*

REQUIRED the Dimensions and Solidity of the greatest Solid generated by the Rotation of a Curve round its Axis, whose Equation is $px^3 = y$, that can be inscribed with its Vertex towards the Base, in a Solid generated by the Revolution of a Curve round its Axis, whose Abscissa is 30, Solidity 16065, and Equation $px^4 = y^3$.

XV. QUESTION 217. *By Mr. Tho. Harris, of Bugbrook.*

REQUIRED the Latitude and Day of the Year when the Evening Twilight is shortest; the Sun's Meridian Altitude being $22^\circ 33'$, at the preceding Noon?

XVI. QUESTION 218. *By the same Gentleman.*

IN what North Latitude, in the Year 1762, will *Syrus* set with *Aldebaran*?

XVII. QUESTION 219. *By Mr. Williams, of Hackney.*

WHAT is the Value, in Pounds and decimal Parts, of a Globe of Sterling Gold, whose Diameter is one Inch. Also of the 5 platonic Bodies whose Sides are one Inch.

XVIII.

XVIII. QUESTION 220. *By the same Gentleman.*

THE transverse and conjugate Diameters of an Ellipsis being given, 40 and 30, required the Circumference thereof?

XIX. QUESTION 221. *By Mr. Paul Sharp, of Beddinden, Kent.*

A cylindric Vessel, whose Depth is 18 Inches more than its Diameter, being full of Water will empty itself through a circular Hole in the Bottom, of one Inch Diameter, in 16,1585234 Minutes. Required the Vessel's Content in Ale Gallons?

XX. QUESTION 222. *By the Same.*

A Gentleman's Garden, in the Form of a common Parabola, has its Abscissa to its bounding Ordinate as 3 to 4, and its Perimeter 86,52653 Poles, required the Area thereof by a simple Equation?

XXI. QUESTION 223. *By the Same.*

GIVEN the Diameter of a Circle inscribed in a right-angled Triangle = 3,60504 and the Difference betwixt the two Lines drawn from its Center to the acute Angles = 2,09845; required the Length of each Side?

XXII. QUESTION 224. *By Miss Padmore, of Marbury.*

HOW Bride and Bridegroom's Ages disagree,
The following Case resolv'd will let you see;
Nine Times the Husband's Age, as late appear'd,
Was equal to the Lady's Age when squared:
Take twice her Age from his, and you will find
That just Sixteen will then remain behind.

XXIII. QUESTION 225. *By Mrs. ANNE NICHOLLS, of Hadham.*

SOME Time in the Spring 1761, I observed the Sun's Meridian Altitude $40^{\circ} 59'$, ten Days after which I observed the Sun's Meridian Altitude $44^{\circ} 11'$; the Latitude and Days of Observation are required.

XXIV. QUESTION 226. *By the Same.*

I observed a Tower right before me upon a rising Plain; I took its Angle of Altitude 30° , and going in a direct Line towards the Tower 70 Yards I took an Angle of Altitude 40° ; I then advanced 42 Yards nearer, and found its Altitude 50° ; the Tower's Height is required.

XXV. QUESTION 227. *By the Same.*

LET a Plain make an Angle with the Horizon $48^{\circ} 30'$; it is required to find a Point on that Plain, where a heavy Body, rolling down thereon, has the greatest Effect possible to break the Plain.

XXVI. QUESTION 228. *By Mr. Edward Johnson, of Hull.*

GIVEN $x^2 + xy + y^2 = a$ } Required a general Theorem
and $x^4 + x^2y^2 + y^4 = b$ } for x , and another for y ,
without any Substitution.

XXVII. QUESTION 229. *By the Same.*

THREE Ships A, B, C, in Order, all under the same Meridian, whose Distances $BC=6$ and $AB=12$ Miles; A, a Merchant

Merchant Ship, C a Pirate, B a Man of War at Anchor between them; C. the Pirate, steered uniformly due East, which the Merchant-man perceiving steered in a direct Line with the Man of War at Anchor, and the Pirates under Sail; always keeping behind the Man of War, (passing over equal Differences of Latitude in equal Time) and came up with the Man of War in the same Time the Pirate had sailed 6 Miles: Required the Distance sailed by the Merchant-man?

* * * Whoever answers the following Question before the 1st of March next, has a Chance by Lot to win 12 Palladiums, which will be delivered in London according to Direction.

PRIZE-QUESTION. By Mr. Edward Johnson, of Hull.

$$\text{GIVEN } xx + yy = \square$$

$$yy + zz = \square$$

$$\text{And } x + y^2 + y + z^2 = \square.$$

To find 4 whole Numbers,
by a general Method, answering the 3 Conditions of the Question.

ANSWERS to all the ÆNIGMAS in the PALLADIUM, for 1761.

All answered by Mr. Nath. Cory, of Harpole, near Northampton.

I. FANCY. II. DISOBEDIENCE. III. Fore WHEEL of a FURNACE Grate. IV. A CRADLE. V. The Letter G. VI. An OTTER. VII. WHIRLIGIG. VIII. A WHEEL-BARROW. PRIZE, A BANK NOTE.

The PRIZE ÆNIGMA answered by Mr. Nath. Cory.

Addressed to Miss Willeter, of Epsom.

YE Nymphs and Swains, repair to th' *sylvan* Grove,
Behold! advancing Spring invites to Love;
Hark, *Philomel* renews her won'd Lay,
Till *Sol* propitious darts his Eastern Ray.
In warbling NOTES* hear how the tuneful Choir
Melodious join to charm th' attentive Ear.
Flora with Sweets perfumes each verdant Mead,
And ev'ry Branch projects a friendly Shade.
The purling Rills and daisy'd Lawns conspire
To fill each Soul with Love's celestial Fire;
Haste then, dear Charmer, to this blest Retreat,
Crown all my Hopes, and make my Joys complete.

* Alluding to a Bank Note.

All the ÆNIGMAS answered by Mr. Isaac Tarrat, of Epsom.

COME, airy FANCY, come along,

1.

Nor DISOBEDIENT fill the Song,

2.

With unpoetic Lays;

But rapid as the WHEELS of Time,

3.

Parnassian Heights attempt to climb,

And borrow *Pindar's* Bays.

Less qualified who may succeed

To hunt the OTTER through the Mead,

6.

And such *Cœtic* Strife,

A.

C

The GENTLEMAN and LADY'S

As BARROWS rumbling o'er the Ground, 3.
 Or WHIRLIGIGS eternal Round, 7.
Pindarics to the Life.
 Hail *GEORGE the third, with grateful NOTE! 5. and
 The Joy of Country and of Court, [Priz-
 Plac'd in th' Imperial CHAIR, 4.
 May he a glorious Peace obtain,
 May *Nesler's* Years conclude his Reign,
 This is the *Poet's* Prayer.

The PRIZE ÆNIGMA answered by Miss Maria Willeter, of Epsom.

O GOLD,* thou mighty Pow'r that all implore,
 The World's great Idol — Thou that all adore;
 Of human Life each Plan I've long survey'd,
 And found *without thee* ev'ry Prospect fade:
 Come then! — a Thousand Pleasures round thee rise —
 But fly — and *with thee* ev'ry Pleasure flies.

* Alluding to a Bank Note.

Mr. George Hayden of Epsom answered the same in Verse, for whose Favour we are obliged; as we are likewise for Mr. Harris's poetical Solution, of Bugbrook.

The PRIZE-ÆNIGMA answer'd thus by Mr. T. Holland, of Marbury.

LET Men be poor or low in State,
 BANK BILLS, or Cash, will make them great:
 For as the Proverb plain doth shew,
 'Tis Money makes the Mare to go.

The Same answered by Miss A. Siers.

COELESTIAL WISDOM, from *Minerva's* Throne,
 Darted her Beams when *Athens' Glory* shone;
 Crown'd with Success, the Goddess cry'd my Fame
 Again shall rise! — and *Albion's* Sons proclaim —
 My kind Influence shall indulgent smile,
Genius shall rise, and grace my favour'd Isle —
 Science and Arts and ev'ry Muse appear,
 With NOTES* harmonious charm th' attentive Ear.
 Each virtuous Mind with Emulation fir'd,
 Till *Worth* its full Perfection has acquir'd:
 Victorious then the noble Task pursue,
 Immortal Laurels are true Merit's due.

* Prize, a Bank Note.

Mr. Randles, of Aldridge School, Staffordshire, answer'd the same.

THE Lady [CLIO] who is *Authoress* of the following deserves a N. B.

The ÆNIGMAS and REBUSES in the Palladium for 1761, answered in a Letter to Miss Nixon, at Lady Rainford's, at Og-Castle, in Barnet-street, Debenham, near Ashworth, concerning the Loss of her Lover.

Dear Miss,

I have lost my humble Servant, the sweet Mr. G—; you say he is beautiful as *Hyacinthus* or *Narcissus*; true — which, like the latter, equally

equally raises his Admiration — add to which a roving Fancy, which, like the *Otter*, is fond of Variety. — Now don't call me envious old Maid — my Heart is still as sound as a Bell — Thanks to Cupid, — therefore I freely resign him to you — you admire his Qualifications — O! excellent, — He sings, and every Note is Love — charming indeed! — then vows eternal Scorn and *Disobedience* to all the Sex if you slight his Passion, when he hopes at the same Time you will admit it. — Then his Learning is so profound, it would puzzle his Understanding to spell *Wheel-barrow*. — His *Genius* is surprising! for every Thought has the Aid of a leaden *Wheel*. — Then how persuasive must be his Eloquence, whose Tongue has the Motion of a *Whirligig*. — In short, he is a modern fine *Gentleman*, and if he suits your Taste, secure him if you can, to rock the *Cradle* and sing Lullaby. Not knowing any Thing else such *Things* are fit for, it is recommended as a very proper Employment for all the *Beaus* and pretty Fellows of Great Britain, by *Miss*, your humble Servant,

POWELL.

*** *Mr. Isaac Tarrat of Epsom claims the 4, Mr. Willeter of Epsom the 2, and Miss Finch of Cambridge (whose Composition is too long to insert) claims the 3 Prize-Ænigma Palladiums, severally, by Lot.*

At the same Time we cannot forbear observing that *Mr. Cory, Miss A. Seirs, Mrs. Powell*, and several Others have greatly merited.

*** The *Ænigmas* to the *Ladies Diary* were answered by *Mr. Swift* and *Mr. Ashton of Stow, Mrs. Anne Nichols of Haddam*, and several Others: And very elegantly in Verse by *A. Seirs*, which curious Answers we have not Room to insert. The *Ladies Diary* (sometime usurped by *Mr. Simpson*, lately deceased) is now ravished from us and done by other Hands, and not by the Friends and Heirs of the late ingenious *Mrs. Beighton*, deceased; who enjoyed the sole Property of that *Diary* Copy, after *Mr. Beighton* and *Mr. Tipper* respectively, for Life; the original Inventors and Improvers of that (formerly useful) Plan and Work.

ANSWERS to the QUERIES in the PALLADIUM, 1761.

I. QUERE 116, answered by Mr. NATH. CORY.

ACCORDING to the *Scripture Table* of Money, a *Gerabor Piece* of Money is one Penny half Penny; consequently the Value of thirty Pieces is equal to three Shillings and nine Pence in *English Currency*.

The Same answered by Mr. George Hayden, of Epsom.

ACCORDING to the *Universal History* the Pieces of Silver were Shekels, which, at 2 Shillings and 4 Pence apiece, amounts to 3*l.* 10*s.* 0*d.* A Shekel being the Value of a Slave.

Mr. Randles makes the Value of the 30 Pieces in *English Currency* 3*l.* 15*s.* The Value of each single Piece of Silver the *Jews* called a *Shekel*.

Mr. J. Knowles, of Epsom, says the Pieces of Silver were probably *Shekels*, which, at about 2 s. 4 d. $\frac{1}{4}$ each, come to 3 l. 10 s. 7 d. $\frac{1}{7}$, the Sum for which *Christ* was betrayed by *Judas*.

The Same answered by Mr. Huntley, of Burford.

THE *Hebrew* and *Chaldee* Expositors inform us, that when the sacred Penmen express any Number of Pieces of *Silver*, without naming the particular *Species*, they always by every such Piece mean the *Shekel* of the Sanctuary, which is allowed by the Annotations to be equal to 4 *Roman Denarii*.

Now, the *Denarius* being just $\frac{1}{7}$ of the *Roman Uncia* (which, according to Dr. *Arbutnot*, consisted of 438 Grains *Troy*, and at 5 Shillings per Ounce is in Value 4 s. 6 d. $\frac{3}{4}$) must be equivalent to 7 d. $\frac{3}{4}$ *Sterling*. Therefore $7 d. \frac{3}{4} \times 4 \times 30 = 3 l. 17 s. 6 d$; the Value of the *Silver* mentioned in the Text referred to by the *Querist*.

II. QUERE 117, answered by Mr. Alexander Rowe.

LET AVBDF represent a spherical Glass, *f* the Center and *Focus*; V the Vertex; VG its *Axis*. And let *a* A, *b* B, be two Rays coming from an Object, and incident on it at the Points A, B; and emerging at the Points F, D; forming the Image of the Object (with intermediate Rays not expressed) *cf*d. — Now, it is evident from the Doctrine of *Optics*, that the Lines or Rays A F d, V f, B D c, are equal one to the other. Therefore of Consequence the Image of *d*, must be *curvilinear*; and the more or less so, according to the greater or less Degree of *Convexity* of the spherical Lens.



III. QUERE 118, answered by Mr. J. Knowles, of Epsom.

THE original Conceit of the Singing of *Swans* before their Death seems to have sprung from the Fable of the Antients, that the Soul of *Orpheus* was transmigrated into a *Swan*; from whence the *Greeks* and *Egyptians* have held that Bird in great Veneration. But as there is no Reason to believe that the Sweetness of their Singing was the Occasion of that Fable, so it is generally believed that they never sang at all.

Mr. Alexander Rowe's Answer to the Same.

IT is more than probable that the *Swan* is unskilled in Singing, both before and at his Death; as Nature never intended him for a vocal *Musician*. But allowing him to have some natural Notes of his own, yet he uses them less musical at his *Sickness* or *Death* than at any other Time. Therefore I desire of our modern Poets for the future to omit *Swan-Singing*; since it is evident that it has Nothing more for its Original than the Songs, or rather Complaints, of some *Bard*, or *Bird*, supposed to be a *Swan*; and has for its Support no Philosophy but *Custom*.

*The Swan a Songster! Sages can you shew,
Who do the Works of Nature truly know?
Then grant the Cranes the sov'reign Power, and they
Among the Larks may bail the rising Day!*

IV.

IV. QUERE 119, answered by Mr. Huntley.

THE mechanical Philosophers assert, that all Matter is essentially the same; that the different Forms of Bodies are but different Modifications of the same Matter, and arise from the different Magnitude, Figure, Texture, and Position, of the constituent Particles; and that the Qualities, Actions, and Powers of Bodies on each other proceed solely from the forementioned Affections of Particles and their Motion jointly. — For Instance, Water in a Pool, rarified by the Sun's Heat, ascends in Vapours till the Vapours have a specific Gravity equal to that of Air, where they rest, constitute Clouds of various Forms. When the Air is rarified by the Wind, and the Vapours condensed, they subside, and at Length fall on the Earth in Rain. Of this Rain, Part mixes with the Earth, enters the Roots and Seeds of Plants, Trees, and Flowers, and constitute Part of their Roots, Stalks, Branches, Leaves, Flowers, Fibres, and Seeds. Part of this afterwards affords *Pabulum* for the Fire, and is by it reduced to Smoke and Ashes. These numerous and various Forms, under which the same Matter appears, proceed from the Change which the subtle *Effluvia* emitted by the efficient Bodies Cause, in the Position, Size, Shape, and Texture of the Particles that constitute this modifiable Substance. — Hence it is judged, that the human Hand, when it approaches near or touches the *Sensitive Plant*, emits *Effluvia*, which alter and dissolve the Structure of the Particles composing the Leaves and small Stems, and cause them to shrink up and as it were die away. — It is nevertheless to be observed, that though these various Effects above-mentioned are owing to the Change of the component Parts, yet the particular Manner of the Operation is not, and perhaps never will be, discovered by us. — *Hucusque procedes, nec ulterius.*

Mr. Alexander Rowe's Answer.

THE *sensitive Plant* is so denominated from its remarkable Property of receding from the Touch, and giving Signs, as it were, of animal Life and Sensation: This Motion it performs by the repulsive Force of the Hand, being more or less, according to the different State of the Air, and other Causes thereon dependent; the Plant being naturally very susceptible of this repelling Force by Reason of its mechanical and delicate Texture, and this by Means of three distinct Articulations; viz. of each single Leaf with its Pedicle; of the Pedicle to its Branch; and of the Branch to the Trunk or main Stem. The primary Motion of all which is the closing of the two Halves of the Leaves on its Rib, then the Rib or Pedicle itself closes. And if the Motion wherewith the Plant is moved be very strong, the very Branches have the Sensation or Effect propagated to them, that then apply themselves to the main Stem, as the single Leaves did before to their Ribs, and these Ribs to their Branches. So that the whole Plant, in this State, forms itself from a very complex branched Figure into a Sort of streight cylindrical one. W. W. R.

V. QUERE 120, answered by Nobody.

VI. QUERE 121, answered by Mr. Harris, of Bugbrook.

WHEN the Pressure of the ambient Air is taken away, the Spring of the before compressed Air expands itself into more Room; but it cannot

cannot expand itself beyond limited Bounds. — As if you lay any considerable Pressure upon a Heap of Wool, it will be contracted into smaller Space, and when you take that Pressure off it will expand itself into greater Space, and when it has expanded itself to its utmost, it ceases to expand farther.

VII. QUERE 122, answered by Mr. Huntley.

THE Earth abounds with Quantities of Sulphur, Bitumen, Nitre, Vitriol, and Salts of various Kinds; from which Exhalations are raised by the Sun's Heat into the upper Regions of the Atmosphere, and spread themselves this Way, or that, according to the Direction of the Wind. Now, it being known by Experiment, that Sulphur and steel Filings, with a little Water, will take Fire; if we conceive in the Air a Quantity of nitrous and sulphureous Particles, with some chalybeate or vitriolic Vapour, all mixed and agitated by the Wind, these Materials will ferment and kindle, and an Explosion will follow, called THUNDER, preceded by a flashing Light, as in the Firing of Gunpowder.

If the Flash of Lightning at the Explosion act with prodigious Violence, so as to break or shatter any Thing, it is called a *Thunder-bolt*. This incredibly strong and rapid Flame is observed to strike on high Places (as being nearer the Clouds whence it darts) oftener than on low Places; it sometimes burns Peoples Cloaths without touching their Bodies; breaks the Bones without wounding the Flesh; has melted a Sword without hurting the Sheath; and burnt the Sheath without affecting the *Sword*. — These wonderful Effects have been variously accounted for by the Philosophers, but they are generally ascribed to the different Figures and Quantity of the Particles of *Lightning*, which dispose them to strike and dissolve some Substances, while they touch not Others.

The Same answered by Mr. W. Williams.

BESIDES the Vapours which the Sun's Heat raises out of Water and moist Places, there is an infinite Variety of *Particles* carried off from Sulphur, Bitumen, volatile Salts, and other Bodies of the like Nature which fly about in the Air, higher or lower, according to the various Degrees of Levity or Gravity. These the Philosophers commonly call Exhalations. Since it is plain that there is a vast Quantity of bituminous Matter all over the Earth's Surface, and that Plants and Animals abound with volatile Salts, we need not wonder that the Heat of the Sun fills the Air with such Particles, which fully accounts for the *Meteors* inflamed in the Air.

When therefore a sufficient Quantity of such Matter is gathered together, it is easy for one or two Particles to be whirled about by the Heat of the Air, and, being once inflamed, to set Fire to all the Rest about it. And the hotter the Summer, the more common are such Fires; which is a Proof that the Matter of them is raised and inflamed by the Heat of the Air, and the Impetuosity of its Motion.

This may be demonstrated by an Experiment in what is called *Aurum fulminans*. If Gold be dissolved in *Aqua regalis* and precipitated with Oil of Tartar, the Dust which sinks to the Bottom being dried gradually and without Fire, may afterwards be fired by a moderate Heat, and

and will make a Noise-like the Discharge of a *Musquet*. But you may make the Experiment as effectually, and cheaper thus. — Take 3 Drams of Salt-petre, a Dram and a Half of Tartar, one Dram of Brimstone, mix and beat them to a very fine Powder. This Powder will take Fire as easily as the *Aurum fulminans*; but gives not quite so great a Crack. So that if we consider the Particles of Nitre, Tartar, and Sulphur, which fly in the Air, are much finer than those which make the aforesaid Composition, we may easily imagine that a moderate Heat will fire them.

It will now be easy to conceive how Thunder is produced in the Air. For first it appears by Experiment that Flame which throws off the Air with great Violence does sometimes occasion a great Crack, and since it is easy for heterogeneous Particles to mix in the upper Region of the Air in great Quantities, and take Fire with an extraordinary Heat, we need not have Recourse to any Thing else for explaining the Cause of Thunder, but may define it to be a rumbling Noise in the higher Region of the Air, occasioned by the sudden Firing of many Exhalations, which cannot be produced otherwise than by a swift Explosion and Rarefaction of the Air.

It is proper to observe, that the Noise of Thunder sounds as if it passed through Arches, and were variously broken. — The Reason is, because the Flame is kindled among the Clouds which hang over one another, while the agitated Air flies between them. And it farther appears, that Flame is the Cause of Thunder; because the Flash is seen before we hear the Crack. From what has been said, we define Lightning to be an inflamed Exhalation, composed of Sulphur and Nitre; which is sometimes with a Noise, as in cloudy Weather; and sometimes without, as when the Sky is clear.

When it thunders and lightens, there sometimes happens what is called a Thunderbolt, or a more solid and most rapid Flame, which darts with incredible Celerity from the Clouds to the Ground, and strikes through every Thing in its Way.

Some fancy that by one Cloud falling down upon another, the Exhalation between them is struck out at the Extremities of the Clouds; though it is more probable that the Flame is beat down by the Wind, and reaches the Ground before the Matter of it is quite spent. Most Thunderbolts are darted aslope through the Air.

For this Reason Thunderbolts strike most commonly upon high Places; for as they fall obliquely through the Air, they meet with Mountains, Trees, and Towers, in their Way. And since the Exhalations which Form the Thunderbolts are as various as there are Kinds of Sulphur and saline Bodies from which they are collected, it is certain that the Force of its Flame must be very different. So that sometimes it burns the Garments and passes over the Body without hurting it. Sometimes it harmlessly penetrates the soft Flesh, and breaks the Bones; as we see Gold and other Metals dissolved by *Aqua regalis* and *Aqua fortis*, while Paper receives no Injury. For the same Reason the Sword is melted while the Scabbard remains intire; just as it would happen if they were laid together in *Aqua fortis*.

Mr.

Mr. George Hayden, of Epsom, answered the same *Quere* in a very rational Manner.

Remark by the Author. Hence it may be observed, that most of the great Operations in Nature are chemically performed. — Read *Chemistry* for an Insight of the Effects of Matter upon animate and inanimate Bodies.

Mr. Alexander Rowe says, “Thunder is a Noise in the Regions of the Air, excited by a sudden Kindling of sulphureous Exhalations.” That the saline Vapours and Exhalations, with the sulphureous ones, being put into a rapid Motion, (by the sudden Alteration of the State of Air) the former sets Fire to the latter, (producing the forementioned Noise) much after the same Manner that Gunpowder is fired, or rather like the Snappings of electrical Fire. The Velocity of the ignited Matter and its Force are inconceivable, and the more solid Parts of this Matter are commonly called *Thunderbolts*. The direful Effects produced by them, together with the liquid Fire called *Lightning*, seem owing to the predominant Matter of the one with its Celerity, and to the predominant liquid Substance of the other with its Velocity, and Directions of both.

*Mean Time from ev'ry Region of the Sky
Red burning Bolts in forky Vengeance fly,
Dreadfully bright, o'er Seas and Earth they glare,
And Bursts of Thunder rend th' incumber'd Air;
At once the Thunders of th' Almighty sound,
Heaven lours, descend the Floods, and rocks the Ground!*

BROOME.

VIII. *QUERE 123, answered by the Author.*

NOBODY having sent an Answer to this *Quere*, the Answer may be reduced to the Nature of different Matter constituting the different Mill-stones, producing the different Effects of *Whiteness* on the Flower, — For we are ignorant of the original and constituent Parts of Matter, and only understand its Qualities by Observation.

IX. *QUERE 124, answered by Mr. Huntley.*

THE *Metaphysicians* divide Time into two Parts, *absolute* and *relative*. *Absolute Time* is Nothing but finite Duration or a limited Portion of Eternity. *Relative Time* is that Part of infinite Duration which begun with the Existence of great Bodies that compose the Universe, by whose Motions it is measured, and with whose Dissolution it will terminate.

The Same answered by Mr. Geo. Hayden, of Epsom.

TIME is a Succession of *Phænomena* in the Universe, or a Mode of Duration, marked by certain Periods or Measures, chiefly by the Motion or Revolution of the Sun.

The same answered by Mr. W. Williams, of Hackney.

THE Idea of Time, in the general, Mr. *Locke* observes we acquire by considering any Part of infinite Duration as set out by periodical Measures. The Idea of any particular Time, or Length of Duration, as a Day, an Hour, &c. we acquire first by observing certain Appearances at regular and seemingly equal distant Periods.

Now,

Now, by being able to repeat these Lengths or Measures of Time as often as we will, we can imagine Duration where Nothing greatly endures or exists; and thus we imagine *Tomorrow, next Year, &c*

Some of the latter School Philosophers define Time to be Duration of a Thing whose Existence is neither without Beginning or End; by which Time is distinguished from *Eternity*.

Aristotle and the Peripatetics define Time to be a Multitude of transient Parts of Motion, succeeding each other, in a continual *Flux*, in the Relation of *Priority* and *Posteriority*. Hence it should follow, that Time itself is Motion, (though but the Measure of Time) or at least the Duration of Motion, considered as having several Parts; some whereof are continually succeeding others. — But, on this Principle or Consideration, Time, or temporary Duration, would not agree to Bodies at Rest; which yet Nobody can deny to exist in Time; or to endure for a Time.

REMARK. *Therefore Time is in Respect of Succession of Ideas; in our Minds; as without some Mind to perceive that Succession, there could be no Time, properly speaking.*

To evade the former Inconvenience, the *Epicureans* and *Corpuscularians* made Time to be a Sort of Flux, different from Motion, consisting of infinite Parts, continually and immediately succeeding each other, from Eternity to Eternity. But others directly explode this Notion, as establishing an ETERNAL BEING, independent of GOD. For how should there be a *Flux* before any Thing existed to flow; and what should that Flux be, a *Substance* or an *Accident*? — Hence Time refers to some living Being to perceive it, prior or coequal with Time. Or Time may be distinguished like Place, into absolute and relative, (as before observed). Absolute Time, being Time considered in itself, and without any Relation to Bodies or their Motions; though not without living Beings. This flows equally, i. e. never proceeds either faster or slower, but glides on in a constant and equable Tenor. — But this Gliding respects Perception; — so that Time amounts to what Mr. Locke has made of it, and no more; who was a just Distinguisher of Things, their Modes and Relations.

Relative or apparent Time is the sensible Measure of any Duration by Means of Motion; for since that equable Flux of Time does not affect our Senses, nor is any Way immediately cognizable thereby, there is a Necessity for calling in the Help of some nearly equal Motion for a sensible Measure, whereby we may determine its Quantity, by the Correspondency of the Parts of *this* with those of *that*.

Hence as we judge those Times to be equal which pass while a moving Body, proceeding with an equable Velocity, passes over equal Spaces, some judge those Times to be equal which flow while the Sun, Moon, and other *Luminaries* perform their Revolutions, which to our Senses appear equal. But since the Flux of Time cannot be accelerated or retarded; though all Bodies move sometimes faster and sometimes slower, and there is, perhaps, no perfectly equable Motion in all Nature, it appears thence to follow, that absolute Time should be something truly and really distinct from Motion; which is the Measure of Time.

For let us suppose the *Heavens* and *Stars* to have remained without Motion from their very Creation, (which might be the Case of their Existence) does it thence follow that the Course of Time would have been at a Stand, or rather would not Duration of that quiescent State have been equal to the very Time now elapsed by their Motion? — Doubtless, while a DIVINE BEING, or some living Spirit, co-existed with those quiescent Bodies, to perceive the Succession of Ideas, or Time absolutely considered (implying to be considered) but not otherwise.

TIME of itself is Nothing but from Thought,
Receives its Rise by lab'ring Fancy wrought,
From Things consider'd — While we think on some
As present, some as past, or yet to come.
No Thought can think on Time, that's still confess,
But thinks on Things, on Motion, or at Rest.

LUCRETII, B. I.

See P. 11. Vol. I. Newton's Principia, by Motte, on Time relative and absolute.

Mr. Alexander Rowe answers this Quere much like the first Part of Mr. Williams's Answer, very adequate to the Subject, concluding

TIME is th' Effect of Motion born a Twin,
And with the World did equally begin;
Time, like a Stream that hastens from the Shore,
Flies to an Ocean where 'tis known no more.
All must be swallow'd in this endless Deep,
And Motion rest in everlasting Sleep.

DRYDEN's Ovid.

Thy Teeth, devouring Time! thine envious Age
On Things below still exercise your Rage;
With venom'd Grinders you corrupt your Meat,
And then, at ling'ring Meals, the Morsel eat.

DRYDEN's Ovid.

But why on Time so lavish is my Song?
On this great Theme kind Nature keeps a School,
To teach her Sons herself. Each Night we die,
Each Morn are born a-new: Each Day a Life!
And shall we kill each Day? If Trifling kills,
Sure Vice must butcher. — O! what Heaps of Slain
Cry out for Vengeance on us! — Time destroy'd
Is Suicide, where more than Blood is spilt.

YOUNG's Night Thoughts.

X. QUERE 125, answered by Mr. Nath. Cory, at Harpole, near Northampton.

WHEN Hyacinthus, mighty Prince, did reign
O'er Amycles, as antient Poets feign,
Belov'd was by Apollo, and Zeph'rus too,
Till 'pollo's Coit, through Envy, Zeph'rus blew,
Against the Head o'th' Spartan Youth did fly;
He of his Wound expir'd immediately.

Apollo

Apollo griev'd—through *Tellus* greater Pow'r
Transform'd the Prince's Blood into this *Flow'r*.

Mr. *Harrison* answered this *Quere* by the *Hyacinth*, or *Ajax*.

The same answered by Mr. *Geo. Hayden*, of *Epsom*.

THE Flower *Virgil* here meant is the *Hyacinth*, of which *Pliny* says, *Hyacinthum comitatur fabula duplex lectum præferens ejus quem Apollo dilexerat, aut ex Ajacis cruore editi. ita discurrentibus venis, ut figura literarum Græcarum AI, ligatur inscripti. Lib. xxi. Ch. 2.*

Mr. *J. Knowles*, of *Epsom*, answers this *Quere* by the *Hyacinth*. See *Lib. xxi. Chap. 2. Pliny*.

Explicatio QUESTIONIS ejusdem à Dom. *Huntleio*, *Burfordiæ*.

ÆNIGMA hocce negotii baud parum scholiorum scriptoribus exhibuit, et à variis variè explicatur. Vir baud obscuri nominis inter Scholiasies censet, *Ænigma* proponi de Nummo quodam argenteo qui hinc temporis et usus, etiam nunc apud rerum studiosos antiquarum extat, cujus facies altera exhibet effigiem Cæsaris cum his verbis. AUGUSTUS CÆSAR, altera florem, cum hoc elogio, *Lucius, Aquilius, Fiorus, Triumvir*. — Alii vero, quibus hæc resolutio non arridet, obiectant Octavianum non accepisse nomen Augusti nisi Anno Urbis 727, *Virgilii* autem 43; *Virgilium* vero edidisse in lucem *Bucolica* sua Anno Ætatis 32. Quâ de causâ accipiunt de flore *Hyacintho*, in quem *Hyacinthus* primum puer *Apollini* dilectus, deinde *Ajax*, qui impatiens iræ *Achillis* arma *Ulyssii* decreta, se ipsum trucidaverat, mutati sunt (si poetarum fabulis fides habenda) observant literas Græcas αἰ, quæ primæ sunt in *Ajax*, αἰας, quæque etiam est interjectio plorandi, in eo flore quodammodo scriptas esse; has quidem literas flori inscriptas: refert *Ovidius* tam ad *Ajacis* nomen, quam ad geminus *Apollinis*, *Hyacinthi* necem deplorantis, his versiculis,

———— Rubefactaque sanguine tellus
Purpureum viridi genuit de cespite florem,
Qui prius *Oebalio* fuerat de vulnere natus.
Litera communis mediis pueroque, viroque
Inscripta est foliis: hæc nominis, illa querelæ.

Met. Lib. xiii. v. 394.

XI. QUERE 126, answered by Mr. *Thomas Huntley*.

MODESTY is that Disposition of Mind which is productive of Decency and a discreet Behaviour, and is in some Measure the Gift of Nature; though confirmed and improved by our Knowledge of the Nature and State of Man, both in Respect to his Creator and Fellow Creatures, so far as it is discoverable by the Light of Reason.

Humility is that Habitude of Mind, which consists in having lowly Thoughts of ourselves, founded on our Knowledge of the Weakness and Depravity of human Nature through the Fall, and the Necessity of a Dependance on divine Grace and a Redeemer's Righteousness, which is discoverable to us only by the Christian Doctrine or Revelation. — Hence appears the Reason why the antient Greek and Roman Writers have no Word expressive of this Habitude of Mind; because being unacquainted with this Revelation or Christian Doctrine, they could not gain the complex Idea of Humility.

XII. QUERE 127, answered by a *Stone-Mason*.

THE *Catenarian Curve* is the Form of an Arch proved by the Writers on *Fluxions* capable to support the most Weight; notwithstanding

standing what has been differently disputed by the late Mr. *Simpson* and other Competitors, now living, for *Premium* from the New Bridge Commissioners, concerning the Forms of the *semicircular* and *elliptical* Arches to answer that Purpose the best; Where the *Height* of the Arch was never distinctly considered by the Disputants with Respect to the Convenience in passing over it. Whereas the elliptical Arch raised on the Conjugate Diameter (not on the Transverse) is certainly *stronger* than the semicircular one; for the same Reason that three Poles will support more Weight at very *acute* Angles with one another at the Top than being more obtusely posited; and the same holds good of two Poles kept right up. That when there is little Difference (as in the present New Bridge at *White Friars*) between the Transverse and Conjugate Diameters the elliptical Arch raised on the Transverse may serve, and last out the Materials, as well as the semicircular one. — But a *Catenarian* Arch (being the inverted Form of a Chain suspended at both Ends) of equal Height and Breadth, will best answer all the Purposes of Strength, and Conveniency in passing over it; though the higher this Arch in Respect of the Breadth the stronger it will be.

XIII. QUERE 128, answered by Mr. Huntley.

WHEN the Mind of Men has, by its Faculties of Sensation and Reflection, acquired clear and distinct Ideas of such Things as come before its View, it is called *sensitive* Knowledge; and when by comparing any of these Ideas together, the Mind immediately perceives their Agreement or Disagreement, it is termed *intuitive* Knowledge; and when the Mind does not gain this Perception but by a Chain of intermediate Ideas, whose Agreement or Disagreement is by Intuition perceived, it is filed by the *Metaphysicians* demonstrative Knowledge. — Now as this *intuitive* and *demonstrative* Knowledge is very confined, and in a Multitude of Instances not attainable, Man is therefore in such Cases, by taking Ideas to agree or disagree, though the Proofs or intervening Ideas have not or, at least, do not appear to have a constant and invariable Connexion one with the other, and yet bear a Connexion so strong as may well induce the Mind to judge of their Agreement or Disagreement. This Act of the Mind is called *Judgement*; and when it takes Ideas to agree or disagree as the Things they represent really do, it is *right Judgement*.

For Instance. I see and have Ideas of *Trees, Houses, Fields*, and a Multitude of other *Objects* which are every Day presented to my View: This is *sensitive* Knowledge.

I perceive that the Earth is an *opaque* Body and inhabited by a Variety of living Creatures: This is *intuitive* Knowledge.

I find, by Observation and mathematical Proofs, that the Earth and planetary Bodies make their respective Revolutions round the Sun in elliptic Orbits, and describe (according to Appearances) equal Areas in equal Times: This is *demonstrative* Knowledge.

Lastly. I judge, that as the other Planets move by the same Laws round the Sun as the Earth, as they are all *opaque* Bodies, that as the Earth has a Moon to reflect Light upon us in the Sun's Absence from our Sight, and some of the other Planets are also furnished with

with the same Conveniency of Attendants, and as creative Wisdom has made Nothing in vain, therefore I judge that the other Planets also have their respective Inhabitants: This is *Judgement*.

Mr. Rowe observes, — *Judgment*, amongst *Logicians*, is a Faculty or rather Act of the human Soul, whereby it compares its *Ideas*, and perceives their Agreement or Disagreement. And the Act of the Mind *assembling* its *Ideas* together, and joining or disjoining them, according to the Result of its Perception is what is called *Judgement*.

In common Discourse, however, the Term *Judgement* is seldom confined to self-evident Truths; but rather signifies those Conjectures that we form, which do not admit of undoubted Certainty; and where we are left to determine by comparing the various Probabilities of Things. Thus a Man of *Sagacity*, who seldom mistakes in the Opinions he frames of Characters and Actions, is said to *judge well*, or *think judiciously*.

XIV. QUERE 129, answered by Mr. Huntley.

FROM the Year current 1761 deduct 1, and the Remainder 1760 divided by 4 = 440. Then, from the constant Number 371, take 1, and add 3; collect the Numbers $1760 + 440 + 373$ into one Sum = 2573; which divided by 7 leaves 4 remaining, which taken from 7 gives 3, the Number of the *Week Day* answering to *Tuesday*, *Julian Style*. — The Number 3 answering to *Tuesday*, Old Style, added to 15, * the Difference in Days from Old to New Style, makes 18, which divided by 7 leaves 4 remaining, answering to *Wednesday*, *Gregorian Style*. See *Royal Astronomer*, Pages 168 and 175. * See also Rule, P. 176, 2d Col. same Book.

Mr. William Chapman, of Foxton, Leicestershire, determines the *Dominical Letters* to 1761 before Christ FE for Old Style, and consequently January 1, on a *Tuesday*. And *Dominical Letters* to 1761 before Christ ED for *New Style*, and consequently January 1 on a *Wednesday*, required. — This Gentleman sent us two Tables of the Course of the *Dominical Letter* for Old and New Style, before and since Christ, by which he determined this Solution, in a particular Case, true. But by his considering 0, 100, 200, 300, &c. instead of 1, 101, 201, 301, &c. Leap Years before Christ, he gave the *Dominical Letters* every where wrong in both Tables for complete Centuries before Christ, which we have rectified in our two new and correct Tables of *Dominical Letters* before and since Christ, according to Old and New Style, at the Beginning of this Work.

Mr. Thomas Harrison truly answered this Quere.

XV. QUERE 130, answered by Mr. Thomas Harris, of Bugbrook.

THE Earth will appear to an Eye in the Center of the Moon's Face like a large luminous Plate, nailed in the Firmament directly over the Head of the Observer, constantly keeping its Place with little Variation. — It will likewise undergo all the *Phases* which the Moon undergoes to an Inhabitant upon the Earth; viz. sometimes it will be all illuminated, sometimes one Side and sometimes another, and sometimes all dark. When an Eye at the Earth sees the Moon all illuminated, an Eye at the Moon will see the Earth all obscured, and the

the contrary. — The Inhabitants in the Moon will likewise see the Earth revolve about its *Axis* from *East* to *West*, with all its *Mountains*, *Cities*, *Continents*, &c. some appearing like dark Spots, and some like Marble Mountains, as the Face of the Moon appears to us, only 15 Times larger, — When the Sun is eclipsed to an Eye at the Earth, a *Lunarian* will see a certain black Spot pass over the Earth from *West* to *East*, with much greater Celerity than any of its native Spots. — When the Moon is eclipsed to the Earth, a *Lunarian* will see the glorious Lamp of Day (the *Sun*) gradually pass behind the dark Body of the Earth, till it is wholly obscured in the sable Mantle of a most surprizing *solitary Night*.

If we are surprized with a total Eclipse of the Sun, which cannot last longer total than a little more than 4 Minntes, in what a dismal State must the poor *Lunarians* remain when they are deprived of the Sun's enlivening Rays for more than two Hours in a profound Obscurity.

BRIZE-QUERE, answered by the Author.

THIS *Quere* (Mr. Williams informs us) is recited in *Chambers's Cyclopædia* under the Word *Year*; and it appears by Bishop *Beveridge's* Chronology that the *Persians* did form their Year by an Intercalation made 6 or 7 Times for 4 Years together, (at a Period of 28 or 33 Years) then once every 5th Year, which they began to use in the Year 1079 since *Christ*; but how those Intercalations were exactly made, neither *Chambers*, nor the said Bishop gives any Account.

Yefdegirdic, or *Persian Epocha* is the Year of the *Julian Period* 5345, answering to the Year of *Christ* 682, commencing on the 16th of *June*. This *Epocha* is taken from the Death of *Yezdegerdis*, the last King of the *Persia*, slain in Battle by the *Saracens*.

The *Persian Year* of 365 Days, consisting of 12 Months of 30 Days each, with 5 Days intercalated or added at the End, is also called *Yefdegird*, to distinguish it from the mean solar Year of 365 d. 5 h. 48 m. 54 s. 46 th. (See *Royal Astronomer*, P. 348) Therefore by reckoning 365 Days only to the Year, the Seasons would revolve in 1506 Years. To prevent which Inconvenience in their Account of Time, the *Persians* reduced the *Equinoxes* and *Solstices* to their former Seats, or Days of the Month on which they first happened, by the Intercalation mentioned in the *Quere*, after a short Period; adding a Day to the Month preceding that of the *vernal Equinox*, making it to consist of 31 Days, and that Year of 366 Days. Also instead of 5, adding 6 Days at the Years End, making the Year sometimes to consist of 367 Days, for-bringing back the *Equinoxes*, gone forward, by 2 Days, to their former Seats. And the *Persians* might continue that Method for 3 Years together, when the *Equinoxes* were advanced 6 Days forward in the Month-days; or by adding 1 Day only at the End of the last of the 4 last of 28, when 7 Days Advance of the *Equinoxes* were to be brought back, or by any other *promiscuous* Method, which however is *doubtful* to ascertain.

In this last Method of *Intercalation*, for the 4 last of 28 Years, when $(28 \times 5 \text{ h. } 48 \text{ m. } 55 \text{ s.} = 6 \text{ d. } 18 \text{ h. } 49 \text{ m. } 40 \text{ s.})$ wanting only 5 h. 10 m. 20 s. of 7 Days) 7 Days are advanced, or the 4 last of 33 Years

Years when $(33 \times 5 \text{ h. } 48 \text{ m. } 55 \text{ s.} = 7 \text{ d. } 23 \text{ h. } 54 \text{ m. } 15 \text{ s.})$ wanting only 5 m. 45 s. of 8 Days) 8 Days are advanced, the Seasons would be nearly brought back to their former Places, in the Month-Days; yet, by this Account, they would be several Days advanced out of Place in the Month-days, before that Intercalation was made, in the last 4th of the 28 or 33 Years; being much more incommodious than the *Julian* Intercalation for that Time.

If the *Persians* intercalated (as in the *Quere*) 6 or 7 Times in 4 Years together, at the End of 28 or 33 Years, it might be in the Month preceding the *vernal Equinox*, besides adding 6 instead of 5 Days at their Year's End, making it to consist of 367 Days for 3 Years together. Then adding a Day at the End of the 4th Year in a 28th Year Period, making the Intercalation 7 Times in the last 4 Years of that Period.

Or they might add 2 Days in the last Year, of the 33, making the Intercalation 8, instead of 7 Times.

The Intercalation of the *Julian* in Respect of that for the *Persian* Year continued, was certainly very defective, though it answered better for a few Years; because, from 1078 to 1768 are 690 Years; which multiplied by 5 h. 48 m. 53 s. produce 167 d. 4 h. 32 m. 30 s. for the *Persian* Intercalation. But, in the *Julian* Account, or Old Style, 172 $\frac{1}{2}$ Days (being 5 d. 7 h. 27 m. 30 s. Difference) were only intercalated. — But the Case is otherwise in Respect to the Intercalation of *New Style*, by an additional Intercalation 3 Times in every 4 Hundred Years, which is commodious enough for *astronomical Computation*; at the same Time the *Equinoxes* and *Solstices* are never kept thereby quite a Day out of Place; nor farther from their first Seat than they are in every third Year from *Bisextile* by that Account.

Although the *Persian* excels the *Julian* Intercalation, for keeping the Seasons for Length of Time nearer to their first Month-days, yet the Irregularity of the *Persian* Intercalation renders that Account entirely unfit for *astronomical Computation*; which Account is therefore to be rejected as unfit for Use.

To keep the Seasons nearer to their Places than they are kept by *New Style*, (of superior Advantage to the *Persian* Intercalation) the following Method is proposed of equal Advantage in Computation with the *Gregorian* or *New Style*.

Since, in the *Julian* Intercalation 1 Day every 4 Years (instead of 6 or 7 Days intercalated in the last 4 of 28 or 33 Years) the Seasons are kept from going back a Day from their Places, in the Month-days, till after 131 Years, while they go forward 5 or 6 Days in the *Persian* Account in less than 28 or 33 Years, before they are brought back by the *Persian* Intercalation, Therefore, with the *Julian* Intercalation every 4th Year, if an Omission of 1 Day be regularly made every 132 Years (being 33 Leap-Years) after the next 68th Year (wherein 1 Day must be also omitted, or the Year made common) which is the next Leap-Year (after the greater Half 66 of 131 Years) the Seasons will be constantly kept to their Places, nearer than by the *Gregorian* Account, except in every 3^d after Leap-Year. For, in above Half of 131 Years the Seasons

Seasons will have fallen back above *Half a Day* in the Month-Days, to which a Day more is *nearest*, and therefore the 68th Year after, being the *first* Leap-Year, above the Half of 131 Years, or 66 Years, 1 Day must be omitted, or that Year made *common* instead of *Bisextile*, to advance the Seasons 1 Day that were fallen back above Half a Day.

Consequently, to the 1st *Persian* Year 1079 (the 1083 being the *first* Leap-Year) add 68, then 132 continually. And do the same for the *Gregorian* Year.

Persian Year.

To 1079

Add 68

1147 Com. Yr.

Add 132

1279 Com. Yr.

Add 132

Persian Style 1411 Co. Yr. &c.

Gregorian Year.

1752 N. S.

Add 68

1820 Com. Yr.

Add 132

1952 Com. Yr.

Add 132

Greg. Style 2084 Com. Yr. &c.

6h

— 5 48^m 55^s

As 11 5 : 1 Year :: 1 Day : 131 Years nearly, when the Seasons fall back a Day by *Julian* Style, which are advanced, as by the above Method, of omitting a Day once every 132 Years, after the first 68th.

Now, $132 \times 11 \text{ m. } 55. = 24 \text{ h. } 23 \text{ m.}$ for which a Day is reckoned, and therefore the Seasons go forward 23 m. in 132 Years: So 1 Day in 8264 Years by this *new Account*. — But the Seasons fall back in the Month-Days 1 Day in 5200 Years, by the *Gregorian Account*. (See Page 140 of the *Royal Astronomer and Navigator*.) Diff. 3064 Years.

ANSWERS to the REBUSES in the PALLADIUM, 1761.

I. SPANIEL.

II. NIXON.

III. DEBENHAM.

IV. GODDENTON.

V. BARNOL.

VI. RAINFORD.

VII. OG.

VIII. ASHWORTH.

IX. POWELL.

Mr. *James Ashton*, of *Stow-School*, answered the 1st; and Mr. *Thomas Cole* the 2d, 6th, 7th, and 8th *Rebuses*.

Mr. *Hall Bellamy* proposed a *New Question* we had not Room for.

Mr. *Cole*, of *Stow-School*, in Answer to the 2d, 6th, and 8th *Rebuses*, says,

MIL

Miss *Asbworth* and *Nixon* have Beauty and Art;
But *Rainford*, O *Rainford*! has wounded my Heart!

II. REBUS, answered by Mr. J. Knowles, of Epsom.

— A blooming and beautiful Angel turn *Vixen* —
Forbid it — O charming and cruel Miss *Nixon*!

VII. REBUS, answered by the Same.

THE Number is *One* that fair Ladies first write,
And *Gold* you will find is each Miser's Delight;
Then, by their *Initials*, you soon will unfold
That *OG* is the Giant recorded of old.

IX. REBUS, answered by Phoenix Lovemore, Esq.

'TIS Powder that scatters Men dead on the Plain,
And like Lightning strikes quick, when the Wounded feel Pain:
An *Ell* is a Measure augmenting a *Yard*,
And *Powell*'s the *Fair* that excites our Regard!
Would you be a bold *Archer*, and twang *Cupid*'s Bow,
You must hit the *Black Swan*, in the Midst of the *Row*!*

* *Pater-Noster.*

In the fragrant *Phoenix-Nest*
Let me lull myself to Rest,
May Sc—t be scorch'd, and I be blest!

ANSWERS to the PARADOXES in the PALLADIUM, 1761.

I. PARADOX, answered by Mr. Walker, Yorkshire.

I readily answer, dear *Miss*, your Request,
And, as in the *Margin*, your *Trees* must be
placed.

Mr. J. Knowles, and Mr. George Hayden of
Epsom, and Others, answered the same.

Answered by Mr. Swift, of Stow.

THE *Epsom* Lady here may see
Both ev'ry *Row* and ev'ry *Tree*.

Mr. Harris, of Bugbrook, answers thus.

DEAR *Miss*, behold your shady Grove,
Delightful for the Scenes of *Love*.

The Same answered by Mr. William Chapman, of Foxton, Leicestershire.

DEAR *Miss*, your shady Grove behold,
The *Margin* does your Scheme unfold.

By Mr. J. Knowles, of Epsom.

MOST lovely Nymph, your Suit is granted,
And, for your Sake, the *Trees* I've planted.

Γαμνλίων 6, 1761.

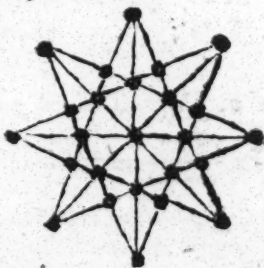
Mrs. Anne Nicbolls, of Hadham, answered the same.

II. PARADOX, answered by Mr. W. Swift, of Stow.

BY th' eleven Days lost, it appears that your Son
Will just come of Age in the Year *Sixty-One*.

E

ANSWERS



ANSWERS to the QUESTIONS in the PALLADIUM, 1761.

I. QUESTION 183, answered by Mr. Huntley, of Burford.

PUT $a = 1134$, $c = 1890$, $x =$ the Place of the proper Name, $z =$ that of the Surname, and the Question furnishes the following Equations.

$$\left. \begin{array}{l} 1 \quad xz \times \overline{x+z} = a \\ 2 \quad \frac{x}{z} \times \overline{x^2-z^2} = c \end{array} \right\} \text{Divide the second Equation by the first,} \\ \text{and that gives}$$

$$3 \quad \frac{x-z}{z^2} = \frac{c}{a}; \text{ this transposed gives}$$

$$4 \quad x = \frac{cz^2 - az}{a}, \text{ which substituted in the 1st Equation gives}$$

$$5 \quad \frac{cz^3 - az^2}{a} \times \frac{cz^2 - az}{a} + z = a; \text{ whence}$$

$$6 \quad cz^5 - acz^4 = a^2. \text{ Solved, } z = 3 = C; \text{ and } x = 18 = S, \\ \text{the 2 Initial Letters of the Name of the learned Dr. SPENCER} \\ \text{COWPER, worthily seen in the } Royal Astronomer.$$

Mr. John Thomson, of Witherby Bridge, Leicestershire, putting $a = 1134$; $b = 1890$, $x =$ the lesser and y the greater Place of the Alphabet, deduces the final Equation $y^5 - \frac{20}{b}y^4 + ay^2 + \frac{a^2}{b}y - ab = 0$. Which solved $y = 18$, and from a former Equation of his, $x = \frac{y^3 - a}{b - y^2} = 3$; answering to the Initials S and C, required, as before.

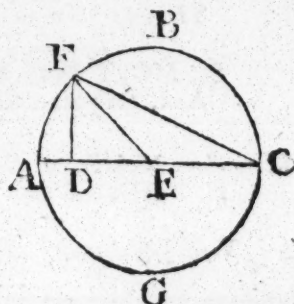
Chesterfieldensis solved the same by the 5th Power. Mr. Randles, of Aldridge-School, Staffordshire; Mr. Alexander Rowe, of Regennis, near Penzance, Cornwall; Mr. Thomas Harris, of Bugbrok; Mr. Buddle, of Chester-le-Street, near Durham; Mr. Walker, of Yorkshire; Mr. Paul Sharp, of Biddenden, Kent; and Mr. Marshall, of Blanchland, near Hexham, and several other ingenious Correspondents answered the same by different Methods.

II. QUESTION 184, answered by the Proposer, Mr. Williams, of Hackney.

LET the Diameter $AC = 14$ Feet. Then the Circumference $ABCG = 44$ Feet. And $\frac{1}{2} AC \times \frac{1}{2} ABCG = 154$ Feet, its Area.

To find a Square equal thereto.

On $CD = 12$ Feet, erect the Perpendicular DF , and draw FC , and from the Center E , draw EF , so shall EF be $= 7$



Feet;

Feet. equal to $\frac{1}{2}$ the Diameter AC, and ED = 4 Feet. Hence $EF^2 - DE^2 = DF^2$. And $DF^2 + DC^2$ is equal to $FC^2 = 154$. Therefore CF is the Side of a Square equal to the given Circle ABCG, per 47. e. 1. required.

In the foregoing Solution, $CD = \frac{1}{2}$ of the Circumference, must be assumed; and therefore this squaring of the Circle depends upon first knowing the Ratio of the Diameter to the Circumference, which is all wanted to be known; — the Rest following of Consequence.

Mr. Alexander Rowe admits the Content = 154, then finds 12.409, &c. = Side $\square = \sqrt{154}$.

Mr. Buddle answered the same; as did Mr. Marshall, of Blencland, near Hexham, and Mr. Huntley geometrically.

III. QUESTION 185, answered by Mr. Marshall, at Blencland, near Hexham, Northumberland.

LET $b = 37,54123$, $c = 14$; $5x$ and $4x$ the greater and lesser Segment, respectively. Then, by the Question and 47. e. 1. we have $\sqrt{97x^3 - 252x + 196} + \sqrt{106x^2 - 252x + 196} = b$. Solved $x = 3$, hence the Base = 27, greater Side 19,8494, and lesser Side 17,6918. Q. E. F.

Mr. Buddle's Numbers are the same.

Chesterfieldensis solved it in the same Manner, but without Numbers. Mr. Joseph Scott brings out the Base 27, the greater Side 19,84938, the lesser Side 17,69185. The Segments 12 and 15.

Mr. Walker solves it otherwise.

IV. QUESTION 186, answered by the Proposer, Mr. Buddle, of Chester-le-Street.

LET $AF = b = c$, $DE = 4 = b$, BC

= x , then $\frac{b+x}{2} = GH$, a Diameter in the

Midst of the Vessel, and $2px^2 + 2bpx + 2b^2p^2$ (putting $p = .7854$) = Solidity of the whole Vessel, and by a Theorem for Hoofs $3x + x^2 - 4 \times bc$ = Solidity of the Hoof BCD, the Liquor drank. Hence, by Quest.

$$\frac{8px^2 + 8bpx - 8bb^2}{9} = \frac{3x + x^2 - 4 \times bc}{9}$$

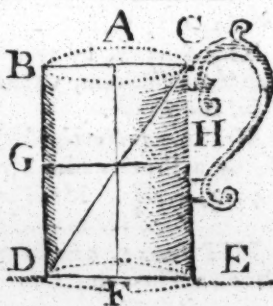
Reduced is $x^2 + 2$, $2x = 20$. Solved $x = 3,5$, nearly the Top Diameter, required.

Mr. Thomas Harris solved the same.

Mr. Walker, by the Method of Trial and Error, finds the Top Diameter 3,447827 true to 6 Places of Decimals he says. He begins by supposing it less than 4, evidently, when he finds it nearly 3,5, which brings out the Tankard's Content too much by 374828. Again, supposing it 3,4, the Error comes out 329028 too little. Whence, As the Sum of Errors: the Difference of the Suppositions :: the last Error : a 4th Number, which added to the last Supposition gives

E 2

3.446746.



3,446746. Again, trying with 3,446, the Error is too little by ,00765573. — Hence, by repeating the Operation, the Tankard's Top Diameter is found as before.

The Same by Mr. John Thomson, of Witherby-Bridge, Leicestershire.

PUT $d = 4$, $b = 6$, $n = \frac{7854}{3} = ,2618$, and $x =$ Top Diameter. Then, by two known Theorems, $\overline{d^2 + dx + x^2} \times nb =$ Solidity of the Tankard. And $\frac{nbx}{d-x} \times \overline{d\sqrt{dx-x^2}} =$ Solidity of the

less Hoof of the Tankard. Therefore, $d^2 + dx + x^2 \times \frac{4nb}{9}$

$= \frac{nbx}{d-x} \times \overline{d\sqrt{dx-x^2}}$, divided by nb , we have $\overline{d^2 + dx + x^2} \times$

$\frac{4}{9} = \frac{\sqrt{d^3x^3-x^3}}{d-x}$, $\times d$ by $d-x$, gives $\frac{4d^3-4x^3}{9} = \sqrt{d^3x^3-x^3}$,

Contracted, $\frac{4d^3+5x^3}{9} = \sqrt{d^3x^3}$; squared, $\frac{16d^6+40d^3x^3+25x^6}{81}$

$= d^3x^3$. Contracted, &c. we have $x^6 - 1,64d^3x^3 = -64d^6$;

Root extracted $x^3 = ,82d^3 \pm \sqrt{,82d^3^2 - ,64d^6}$ $\therefore x =$

$^3\sqrt{,82d^3 \pm \sqrt{,82d^3^2 - ,64d^6}} = 3,4471$, &c. W. W. R.

This Solution, by a curious and careful Computer, who always commanded our Esteem, confirms the Truth of Mr. Walker's Solution by Trial and Error.

Mr. Thomas Huntley finds $x = 3,44708$ Inches; and Chesterfieldensis, by a Process like Mr. Thompson's, finds the Top Diameter = 3,4474, nearly. Mr. Paul Sharp 3,44708.

Mr. Thomas Marshal, of Blenchland, solved it thus.

PUT $b = 4$, $e = 6$, $p = ,2618$, $x =$ Top Diameter. Then, by a known Theorem, $bcp + cpx^2 + b^2cp =$ Solidity of the Tankard.

And $\frac{cp\sqrt{b^3x^3-cpx^3}}{b-x} =$ the Solidity of the Liquor that was drank.

Hence, by Question, $\frac{cp\sqrt{b^3x^3-cpx^3}}{b-x} = \frac{4bcp + 4cpx^2 + 4b^2cp}{9}$.

This reduced, $x^3 - 1,8\sqrt{b^3} \times x^{\frac{3}{2}} = 8b^3$. Solved $x = 3,448$ Inches the Top Diameter.

Mr.

Mr. Alexander Rowe's Solution.

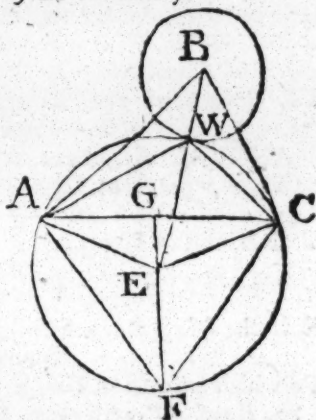
LET $a = 6$, $b = 4$ Inches, $c = ,2618$; $s = \left(\frac{4}{9} + \frac{5}{9} = \right)$
 61,6875 cubic Inches, (*the Solidity of a Tankard in general*) and $x =$
 Top Diameter. Then, $\overline{bx + x^2 + b^2} \times a \times c = s$; $\therefore \overline{xx + bx} =$
 $\frac{s}{ac} - b^2$. Now $\square$ completed and solved, $x = \sqrt{\frac{s}{ac} - \frac{3}{4}b^2} - \frac{1}{2}b$
 $= 3,2$ Inches.

But because the Solidity is not given, (and the Height being common, yet not necessary in Regard to what follows) it will be, As x^2 ($\square$ Top Diameter) : 4 (or $\frac{4}{9}$ Quantity drank) :: 16 ($\square$ of Bottom Diameter) : 5 (or $\frac{5}{9}$ Quantity remain) $\therefore 5xx = 64$; whence $x = 3,57$ Inches. W. W. R.

V. QUESTION 187, answered by Mr. Huntley.

WHEN the Conditions of a Question are so independent one of another as to admit of distinct *Constructions*, and that from the Intersections of their *Loci geometrici*, a Construction of the whole may be formed; such Constructions will be simplest and preferable to those derived from *analytical Investigations*.

Construction. Draw $AC = 10$ Miles, $AB = 9$, and $BC = 7$: Make the $\angle EAC = 113^\circ 26' - 90^\circ = 23^\circ 26'$; bisect AC in G , draw GF perpendicular to AC ; with Radius EA describe the Circle ACF , and on the Point B , with Radius $= 3$, describe another Circle to touch or intersect the other; the Point of Contact or Intersection W , determines the Place of the Mill.



Demonstration. Draw the right Lines EC , AE , CF , AW , CW , and BE , by the 20th Prop. of III *Euclid*, the $\angle AEG$ is double the Angle AFG , and the $\angle AEC$ is double the $\angle AFG$, because $AG = CG$ and GF is perpendicular to AC ; therefore $\angle AFC$ is $= \angle AEG$, and consequently the Comp. of $\angle EAC$; but the $\angle EAC$ by Construction is $=$ the Comp. of the Supplement of the given $\angle$; therefore $\angle AFC$ is $=$ the Supp. of the same; and the $\angle AWC$ is $=$ to the given $\angle 113^\circ 26'$ by 22. e. 3. By Construction, the Radius $BW = 3$ Miles. — Therefore W is the true Place of the Windmill.

Calculation. In the right-angled $\triangle AEG$, $AG = 5$, and $\angle EAG = 23^\circ 26'$ to find $AE = 5,449451$. In $\triangle ABG$, the 3 Sides are known to find $\angle BAC = 42^\circ 50'$ and $\angle ABC = 76^\circ 13' 31''$. And in $\triangle ABE$ are given $AB = 9$, $AE = 5,449451$, $\angle BAE = 66^\circ 16'$, to find $\angle ABE = 36^\circ 14' 15''$ and $EB = 8,439008$, whence it appears that the Sides BW , EW , nearly coincide. Lastly,

in Triangles BAW, BCW, $AB = 9$, $BW = 3$, $BC = 7$, $\angle ABW = 36^\circ 14' 15''$ and $\angle CBW = 39^\circ 59' 16''$ to find $AW = 6,815$, and $RW = 5,0815$. W. W. R.

Mr. Buddle answered it by Construction, as above.

Mr. Paul Sharp the Proposer makes $AW = 6,97379$ and $CW = 4,91115$ by an elaborate and accurate analytical Process, and difficult final Equation, by which he finds half the Difference of the Angles ABW and $CBW = 1^\circ 53' 13''$, which added to and taken from $38^\circ 6' 47'' =$ Half their Sum, gives $\angle ABW = 40^\circ$, and $\angle CBW = 36^\circ 13' 3''$. — *Chesterfieldensis* substitutes for the $\angle BCW$, and by an algebraical Process and difficult final Computation of several surd Quantities, determines it $= 21^\circ 8' 6''$ and $CW = 4,90749$, $AW = 6,97829$ very accurately, confirming and improving the Proposer's Solution.

Mr. Alexander Rowe finds the Segments of the Base, AC , by a Perpendicular let fall from B , one $= 6,6$ and the other $= 3,4$, then proceeds trigonometrically, till he finds $\angle WAC = 26^\circ 46'$ ($\angle AWC = 113^\circ 26'$) $AC = 10$, $AW = 6,98$ and $CW = 4,91$ Miles, required. — Mr. Walker answered it differently. As did also Mr. Marshall, of Blencbland, near Hexham.

VI. QUESTION 188, answered by the Author of the Royal Astronomer and Navigator.

ANNUAL Argument $1^\circ 21' 0''$

2d Eq. Apogee, cont. Sign	— 12 17 59	Log. Tan. for	} 9.9531830
True Anom. in Syzygies	1 8 42 1	Eq. D's Cent. ter deduct . .	
	Half = $19^\circ 21' 0'' \frac{1}{2}$	L. Tan.	

Half the M. An. wanting Correct.	21 21 46 $\frac{2}{3}$	Tan.	9.5923439
	Doubled $1^\circ 12' 43' 33''$		

To which answers in Tab. p. 82, }	— 1 22
83, Royal Aft. with contr. Sig. }	—

	21 20 24 $\frac{2}{3}$	$= \frac{1}{2}$ M. Anom.
	Doubled 42 40 49	$=$ M. Anom.
From above	38 42 1	$=$ true Anom.

	Diff. — 3 58 48	Eq. D Cent. in Syzyg.
Royal Aft. P. 390. Eq. D's Cent. }	— 4 2 37	
and 2d Eq. supplemental D }		

Royal Aft. p. 63, Annual Arg. }	— 3 49, 2d Sem. Ann. Equat.	
$1^\circ 21'$, II. Equat. . . . }		
		— 3 29
	— 0 10''	Error.

Demonstration. That the Sum of the second Equation of the Moon's Apogee with a contrary Sign, and of the annual Argument with its proper Sign, is equal to the Moon's true Anomaly in Syzygies.

$\odot - \text{D} - \text{D}$'s Anom. true $= \odot - \text{D}$'s Apogee true.

Or $\odot - \text{D} + \text{D}$'s Anom. true $= \odot - \text{D}$'s Apogee true.

i. e. in Syzygies (because $\odot - \text{D} = \circ$) D 's Anom. true $= \odot - \text{D}$'s Apogee true.

But $\odot - \text{D}$'s Apogee 1. equated $+$ D 's Ap. 2. equated with contrary Sign $= \odot - \text{D}$'s Apogee true, or 2 equated $= \text{D}$'s true Anomaly. Q. E. D.

N. B. Because $\odot - \text{D} = 6^s$ in Opposition, therefore An. D true $= \odot - \text{D}$'s Apogee true.

 The annual Argument connected with the second Equation of the Moon's Apogee, with a contrary Sign, $=$ true Anomaly of the Moon in Syzygies, including the central Equation. Therefore from the true Anomaly you may find the mean by the Converse of Halley's Method, that finds the true from the mean, and the Difference between the true Anomaly given and the mean Anomaly found will be the central Equation in Syzygies, according to which Rule the central Equation is constructed.

VII. QUESTION 189, answered by Chesterfieldensis.

FIRST $600 \div 30 = 20$ s, and put $t = 20 + 1$, put also the Log. $t = \text{Log. } s = m$, and put $T = \text{Log. } 800$, and x for the Number of Strokes required. Then, by the Nature of that Machine, and the

Principles of Philosophy, $mx = T$, and $\frac{T}{m} = x = 137,007$, the

Number of Strokes required.

Mr. Thomas Harris says, when the Receiver and Barrel are equal, the Number of Turns to rarify 800 Times is $= 9,6444 \times 14.207 = 137,017$, &c. the Turns required.

VIII. QUESTION 190, answered by Mr. Thomas Huntley.

PUT $x =$ yearly Rent required, $a = 1000$ l. $c = 225$ l. and say,

As $a : c :: x : \frac{c}{a}x$, and per Quest. $x + \frac{c}{a}x \times x = a$; $\therefore x^2 +$

$\frac{a}{c}x = \frac{a^2}{c}$, and, by Reduction, $x = \frac{\frac{1}{2}a^2}{c} + \frac{a^2}{c} - \frac{1}{2}a = 1.84$

,09, or 84 l. 1 s. 9 d. $\frac{1}{2}$.

The Same answered by Mr. George Stapley, of Scots-float.

LET $x =$ the Rent sought; $a = 2000$ s. the present Rent, $b = 20$ s, and $c = 1$ l. and its Taxes $= 24$ s. 5; then, As $b : c :: x :$

$\frac{cx}{b} = a$. Hence $x = \frac{ab}{c} = 1632$ s. 65, or 81 l. 12 s. 7 d. 536,

&c. the Rent sought.

Chesterfieldensis, conceiving different, answered the same Question otherwise.

If 1 l. clear or full Rent pay 4 s. 6 d. Taxes, what will 100 l. clear or full Rent pay? Answer, 22 l. 10 s. the Taxes. — Then $100 - 22, 10 = 77$ l. 10 s. the Rent the Tenant is to pay. Q. E. I.

Mr. Alexander Rowe answers it exactly in the same Manner and Numbers.

A.

As 1*l*. : 4*s*. 6*d*. :: 100*l*. : 22*l*. 10*s*. = Taxing. Whence 100*l*. - 22*l*. 10*s*. = annual Rent the Tenant must give, he paying the Taxes. W. W. R.

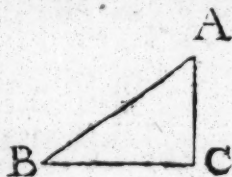
Mr. Thomas Harris, of Bugbrook, answers it thus, like the Proposer. Let x = Rent the Tenant ought to pay, when he pays the Taxes, and $a = 4*s*. 6*d*. = .225 of a Pound $\therefore x + ax = 100*l*. \therefore x =$$

$$\frac{100}{1+a} = 81*l*. 12*s*. 7*d*. $\frac{3}{4}$; and the Taxes are = 18*l*. 7*s*. 4*d*.$$

W. W. R.

IX, QUESTION 191, answered by Mr. Alexander Rowe.

LET $d = 16 \frac{1}{2}$ Feet; $a = 5^s$ of Time; x = Seconds of Time of Descent along AC; then $x + a$ = Time of descending through AB, and $dx^2 = AC$. $\therefore$ By Laws of falling Bodies, whose Times of describing AC and AB are as the Height to the Length of the Plane; $x : dx^2 :: x + a : dx^2 + a dx = AB$. Now, put $s. \angle B = (48^\circ 30') = .748955 = b$; Rad. = 1; Then, by



Trigon. $b : dx^2 :: 1 : \frac{dx^2}{b} = AB$. Therefore, $dx^2 + a dx =$

$$\frac{dx^2}{b}; \text{ which reduced } x = \frac{ab}{1-b} = \text{Seconds } 14,916,748, \text{ scilicet.}$$

Whence $AB = 4778,2474$ Feet. W. W. R.

From whence an useful Corollary may be drawn.

Mr. Thomas Harris, of Bugbrook, answers it by the same Process and Numbers.

Remark. From above, As $AC : AB ::$ Time describing $AC :$

Time describing AB . That is, $dx^2 : \frac{dx^2}{b} :: x : \frac{x}{b}$; whence $\frac{x}{b}$

$$- x = a. \therefore x = \frac{ab}{1-b}, \text{ as before.}$$

Mr. Buddle answered the same otherwise.

Mr. Luntley's Theorem, by a similar Process, is the Length of the

$$\text{Plane } BA = \frac{a^2 b d}{1-b^2}.$$

Mrs. Anne Nichols of Haddam, and Mr. Edward Kimpton, Junior, of Barkway, solved it, both in the same Manner. Mr. Walker solved it differently. Mr. Marshal, of Blencbland, near Hexham, also solved the same.

X, QUESTION 192, answered by Mr. Stapley, of Scots-float, the Proposer.

PUT $a = 3941,32$; $b = 2107,64$, and $x = \frac{1}{2}$ the Sum and $y = \frac{1}{2}$ the Difference of the Father's and Son's Ages. Then, $x + y =$ the Father's Age; and $x - y =$ the Son's Age; and per Quest. we have

have $2x^2 + 2y^2 = a$, and $4y^2 + 4x = b$; the first Equation gives y^2

$$= \frac{a}{2} - x^2, \text{ and the 2d gives } y^2 = \frac{b}{4} - x, \therefore x^2 - x = \frac{a}{2} - \frac{b}{4}$$

$$\frac{b}{4}; \text{ solved } x = \sqrt{\frac{a}{2} - \frac{b}{4}} + \frac{1}{4} = 38,5; \therefore y =$$

$$\sqrt{\frac{b}{4} - x} = 22,1; \text{ consequently, } x + y = 60,6 = \text{the Father's}$$

Age; and $x - y = 16,4 = \text{the Son's Age.}$

The same was answered by Mr. John Thomson, Mrs. Anne Nichols, Mr. Edward Kimpton, Mr. Alexander Rowe, Chesterfieldensis, Mr. Walker, Mr. Thomas Huntley, Mr. Thomas Sadler, Mr. John Buddle, all by a different and very elegant Method of Substitution, which we have not Room to insert.

XI. QUESTION 193, answered by Mr. Stapley, the Proposer.

LET 1d. : ,050321 :: 40l. : 2l.,01284 = the Annuity 40l. will buy to continue 40 Years.

Again, As 1l. : 8,1757 :: 2,01284 : 16l.,4563 = the present Value of 2l.,01284 to continue 10 Years; hence the Money to be paid down by the second Tenant is 16l. 9s. 1d. $\frac{1}{2}$ nearly, required.

Mr. Buddle solves it thus.

SUPPOSE the yearly Value of the Farm 2l.

The proportional Interest for $\frac{1}{2}$ yearly Payments at 4l. per Cent. will be 1,0198037 - 1 = ,0198037.

Log. Rate 1,04 . . . ,0170333 } Then 50,49561 - 10,51772
Multiply by Time 40 } = 39,97789 the present
Worth.

Log. Rate and Time ,6813320 }
Log. com. Principal 1,7032536 } Therefore 39,97789 : 2l.
:: 40l. : 2l.,001106 the
Diff. is Log. 10,51772 1,0219216 } yearly Income.

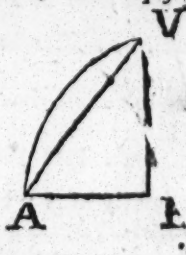
Now, because the 1st Tenant has already had the Farm 30 Years, it follows that the present Worth of 2,001106l. to continue 10 Years, will be the Value of the Remainder of the Lease. — Consequently the second Tenant must pay to the 1st, 16,3961l. (by a Process like the former) or 16l. 7s. 10d. Q. E. I.

Chesterfieldensis, taking the Question in a different Sense, solved it otherwise.

XII. QUESTION 194, answered by Mr. George Brown, the Proposer.

LET VAB represent a semicubical Parabola, whose Parameter is Unity, and the Length of the Curve a Maximum, as per Question. Then, put the Abscissa VB = x, its Semi-ordinate BA = y

and the Length of the Curve be $\frac{4 + 9y^2}{27} - 8$



$\therefore \frac{4+9y^2-8}{y^2+y^{\frac{3}{2}}}$ per *Quest.* must be a *Maximum*. In Fluxions, &c.

$= \frac{4}{3} \therefore x = \frac{8\sqrt{3}}{9}$; Length of the Curve $= \frac{56}{27}$, and the Cord

$VA = \frac{4}{3} \sqrt{\frac{7}{3}}$; Then, As $VA : VB ::$ given Cord $= 46 :$

$\frac{92\sqrt{7}}{7} = 34,772731 =$ *Abscissa*, [agreeing with Mr. Thompson's

Number] As $VA : BA :: 46 : \frac{46\sqrt{21}}{7} = 30,114068 =$ Semi-

ordinate. As $VA : \text{Curve} = \frac{56}{27} :: 46 : \frac{92\sqrt{21}}{9} = 46,844107$

$=$ Length of the Curve, the Dimensions required.

The Principles used in this Solution will (if rightly applied) give an easy Solution to the Prize Question in the Ladies Diary for 1741.

Mr. John Thompson, of *Wetherby Bridge*, by an elaborate and elegant Method of Solution, we have not Room for, finds $y =$ Semi-ordinate $= 30,1146$, and thence the *Abscissa* $= 34,7722$, from a final Equation of the 6th, 4th, and 2d Powers, (confirming the Truth of the Proposer's Solution) which Artift we find to be accurate (as he is elegant) in all his Solutions, and always to be depended on.

Cbeſterfieldienſis has given an *analytical Solution* to the same Question; but for Want of working out the Numbers we cannot compare the Result with others, which is a good Indication of the Principles being true when the numerical Results, by different Methods, agree.

The *Task* of going through the *Proceſs* of all Solutions sent, is not our Buſineſs; but only the Comparison of Results and Method.

After this indefatigable Artift has found the *Fluent* (from the

Fluxion of the Curve) $\frac{8a}{27} \times \frac{3}{2} \sqrt{1 + \frac{9y}{4a}}$ he corrects it to $\frac{8a}{27}$

$\times \frac{3}{2} \sqrt{1 + \frac{9y}{4a}} - \frac{8a}{27}$; and argues that as the Length of the

Curve is to be a *Maximum*, where x is a given Quantity, therefore y will be a *Maximum* when a is so; substitute $\sqrt[3]{ax^2}$ for y (he says)

and you will have $\frac{8a}{27} \times \frac{3}{2} \sqrt{1 + \frac{9\sqrt[3]{ax^2}}{4a}} - \frac{8a}{27}$, which

thrown into Fluxions and reduced gives the Value of a , and consequently of y ; being $= \sqrt[3]{ax^2}$. Q. E. I.

Mr. Thomas Harris concisely solved it after another Manner without bringing out the Numbers, as did Mr. Buddle,

Mr.

Mr. *Alexander Rowe's* Numbers being different from Mr. *Thompson's* and also the Proposer's we omit his Solution.

XIII. QUESTION 195, answered by the Proposer.

PUT $28952,1956 = s$; $3749,25 = c$; $3927 = m$, $x =$ Height of the *Paraboloid*, and $2y =$ Diameter of the Base, then we have,

$4y^2 mx = s$, and $\frac{8m}{6xy^2} \times 4y^2 + \frac{y^4 \frac{3}{2}}{x^2} - \frac{y^2}{x} = c$, from whence

x is found $= 32$, and $y = 24$.

Now, for the *greatest Cylinder*.

Let $GC = 2a, = 48$, $BD = 32, = b$; $7854 = m$, and $x = AE$, then by the Property of the *Parabola*, we have as $a^2 : b :: x^2 :$

$\frac{bx^2}{a^2} = BE$, hence $\frac{a^2b - bx^2}{a^2} = mn$, and $\frac{4a^2bx^2 - 4bx^4}{a^2} \times m, a$

Maximum, which, in Fluxions, is $8a^2bx\dot{x} - 16bx^3\dot{x} = 0$, or $a^2x -$

$2x^3 = 0$, consequently $x = \frac{a}{2}$. W. W. R.

Mr. *Paul Sharp*, by an elegant Process, finds the *Abscissa* $= 32$, and Semi-ordinate of the generating *Parabola* $= 24$. And also finds the *greatest Cylinder's* Altitude $= \frac{1}{2}$ the Altitude of the *Parabola*, $= 16$, whence the Content of the *greatest Cylinder* $= 14476,4928$, agreeing with the Proposer's Solution.

Mr. *Buddle* makes $x =$ *Abscissa* $= 32$, and Semi-ordinate $= 24$ nearly; Diameter of the *greatest Cylinder* $= 33,941$ and Solidity $1446,3857$, &c. required.

Mr. *Thompson*, of *Witberby Bridge*, finds the *Abscissa* (from an Equation of the 6th Power) $= 24,1818$, Semi-ordinate $27,6085$, and the *greatest inscribed Cylinder* $= \frac{1}{2}$ the *Paraboloid*; elaborately deviating, by his Process from the Proposer. — Who, we conceive, only mistakes in his *Data* assumed, as he is generally so very accurate.

XIV. QUESTION 196, answered by Mr. Thomas Huntley.

FROM the Table in the *Royal Astronomer*, P. 210, take the right Ascension of the given Star for the Year 1750, which is $19^h 38^m 35^s$, and the annual Variation $2,91^s$, which, multiplied by 11 Years, makes $32^s,01$, and $32^s,01 + 19^h 38^m 35^s$, and, reduced to Degrees of the Equator, gives $294^\circ 46' 45'' =$ the Star's right Ascension to January, 1761.

From the same Table, take the Star's Declination $= 8^\circ 13' 44''$, N. for January 1750, and the annual Variation $= 8'',36$, which multiplied by 11 gives $91'',96$, which, $+ 8^\circ 13' 44''$, gives $8^\circ 15' 16''$, N. for the Declination, January 1761; and the *ascensional* Difference corresponding thereto I find to be $= 10^\circ 29' 56''$.

The Star's right Ascension . . = $294^{\circ} 46' 45''$
 Ascensional Difference . . = $10\ 29\ 56\ +$

Oblique Descension from Υ . . = $305\ 16\ 41$
 To which Add . . = 180

Subtract . . $485\ 16\ 41$
 360

Oblique Ascension of Ascendant . . = $125\ 16\ 41$ from Υ .
 Or . . = $54\ 43\ 19$ from Δ .

Then, in the annexed Scheme, Put
 $s = \text{Sine}$ and $c = \text{Cos.}$ of $23^{\circ} 28' 30''$
 $= \angle ABD$, $n = \text{Sine}$, $t' = \text{Cot.}$ 54°
 $43' 19'' = AB$. $T = \text{cot.}$ $38^{\circ} 31'$
 $30'' = \angle BAD$. And, by a spheric

Theorem, $ST \div n + ct' = \text{cot. BD}$
 $= 1,2618086 = \text{cot. } 38^{\circ} 23' 50''$,
 which subtracted from 180° leaves
 $141^{\circ} 36' 10''$ from $\Upsilon = 4^{\circ} 21' 36'$
 $10''$, the Sun's Place at the cosmical
 Setting of the Star, the Point of the
 Ecliptic opposite thereto is 10° or $21^{\circ} 36' 10''$, the Sun's Place on
 February 9, (according to Table, R. Astron. P. 247.) when the bright
 Star of the Eagle sets with the Sun. W. W. R.

Mr. Buddle answers the same on February 9, 1761, and refers to
 the Royal Astronomer, P. 247, for the Method of Solution.

Mr. Randles answers the same by a different Method.

Mr. Marshall, of Blencbland, near Hexham, also answered the
 same.

XV. QUESTION 197, answered by Mr. John Thomson.

PUT $d = 5,090909$; $r = 10$; $x = AB$.

Then, by the Writers on Fluxions, $\frac{8rx - 3x^2}{12r - 4x}$

$= d$, $\therefore 12dr - 4dx = 8rx - 3x^2$, and $3x^2 -$

$8rx - 4dx = -12dr$. Put $\frac{8r + 4d}{3} = n$, then

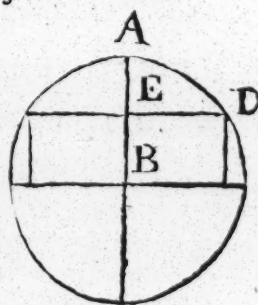
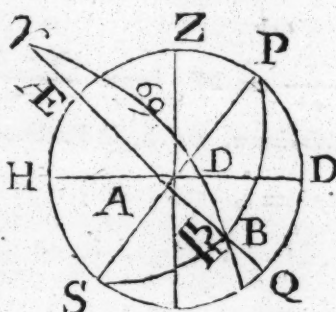
$x^2 - nx = -4dr$, whose Root extracted

gives $x = \frac{n}{2} \pm \frac{1}{2} \sqrt{n^2 - 16dr} = 8$. Now,

for the Superficies of the greatest inscribed Cylinder.

Put $v = AE$, then $2r - v \times v = DE^2 = 2rv - v^2$, and

$2rv - v^2 \times x - v = \text{a Maximum}$. Fluxed, $2rv - 2vv \times x - v$,



$$-v \times \overline{2rv - v^2} = 0. \text{ Reduced, } v^2 - \frac{4r-2x}{3}, \times v = \frac{2rx}{3}.$$

Put $m = \frac{4r+2x}{3}$, then $v^2 - mv = -\frac{2rx}{3}$, Square completed and

$$\text{Root extracted gives } v = \frac{m}{2} \pm \sqrt{\frac{m^2}{4} - \frac{2rx}{3}} = 3,5215.$$

And the whole *Superficies* $= 3,1416 \times 2 \sqrt{\overline{2r-v} \times v \times \overline{x-v}}$,
 $+ 3,1416 \times 2 \times \overline{2r-v} \times v = 6,2832 \times \sqrt{\overline{2r-v} \times v \times \overline{x-v} \times \overline{2r-v} \times v} = 578,96206$ Inches. W. W. R.

Mr. *Buddle*, the Proposer, making $2px^2 \sqrt{db+bx-dx-x^2} =$ Solidity, in *Fluxions* and reduced, he gets $x^2 + 3\frac{2}{3}x = 64$, whence he finds $x = 6,35$ Inches, Diameter of the Cylinder, and the *Superficie* nearly 284 Inches; who puts $x = EB$, $d =$ Diameter $- AB = 12$; $b = AE = 8$; $p = .7854$.

Mr. *Walker*, of *Yorkshire*, finds the *Superficies* 245,764395234, &c. *Chesterfieldensis* answers it thus.

PUT $p = 5,090909$; $r = 10$, and $x =$ Height of the required *Frustrum*. Then, by Ex. 12. P. 228, *Emerson's Fluxions*, 1st Edit.

$$\frac{8rx - 3x^2}{12r - 4x} = p; \text{ whence } x^2 - \frac{4p+8r}{13}, \times x = -4rp, \text{ where } x=8,$$

the Altitude of the Globe's Segment, which put now $= b$.

Again, put $y =$ the Cylinder's Altitude required. Then $b - x =$ Distance of the Cylinder's Top from the Vertex, and $2r - b + y = 12 + y = c + x =$ Dist. Cylinder's Top from the Bottom of the Globe. By the Nature of the Circle $c + y \times b - y = \square \frac{1}{2}$ Diam. of the Cylinder, and $4cb - 4cy - 4y^2 = \square$ of the Cylinder's Diam. $+ 4by$

which multiplied by qy , ($q = .7854$) gives $4cbqy - 4cqy^2 - qy^3, + 4bqy^2$

the Cylinder's Solidity. ——— In Fluxions, and reduced, $y =$

$$\sqrt{\frac{cb}{3} + \frac{d^2}{9} - \frac{d}{3}} = 4,478532 \text{ Altitude, (where } 2d = 2c - 2b)$$

and 15,235304, the Diameter of the Cylinder.

Hence, Curve Surface 214.357 } Agreeing with Mr. *Thomp-*
 Double Area at Base 364.605 } *son's* elaborate Solution.
 578.962 } W. W. R.

XVI. QUESTION 198, answered by Mr. Thomas Huntley, the Proposer.

BY a few Trials x is found between 8,7 and 8,8; the former giving $\overline{x} \mid + \overline{l.x} \mid = 931,059$, and the latter $= 1044,7646$; therefore

therefore put $m = 8,7$ and $n = 8,8$, $p = 68,941$, $q = 44,7644$,

and we have $x = \frac{mq+np}{p+q} = 8,76063$. — Assume $x = 8,76063$ and

$\frac{Lx}{x} + \frac{Lx}{x} = 998,3513$, put $m = 8,76063$, $n = 8,8$; $p = 1,6487$, $q = 44,7646$, whence $x = \frac{mq+np}{p+q} = 8,76131$. W.W.R.

Mr. Alexander Reave, of Reginis Cornwall, by the same Method, first supposing $x = 8$, where the Error comes out 574,96 too little, then $x = 9$, where the Error comes out 318,42 too much, whence he gets $x = 8,64$, &c. and repeating the Operation, he finds $x = 8,763$. And Mr. Buddle, by a like Method, finds $x = 8,766$.

Mr. Thomas Marshal, of Blencbland, near Hexham, Northumberland, by the same Method of Trial and Error, (first supposing $x = 9$) finds $x = 8,76$, nearly.

XVII. QUESTION 200, answered by the Author of the Royal Astronomer and Navigator.

September 13, 1761, Midnight. } D's Pl. Green. | D Lat. | D Decl.

By Royal Astronomer. }

D So. that Day | Diur. Diff. Southing. | D's hor. Par.

11^h 50^m | 43^m | 55' 51"

Moon's horizontal Semi-diameter 15 15

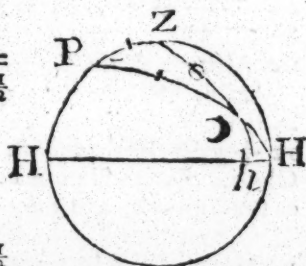
At 12 at Night the Moon is 10^m in Time past the Meridian.

In the annexed Scheme { $PZ = \text{Com. Lat.}$ { To find D b.
 { $= 38^{\circ} 31' \frac{1}{2}$. {
 { $P D = \text{D Polar}$ { D's tr. Alt. =
 { Dist. = $99^{\circ} 31'$. { $28^{\circ} 58' \frac{1}{2}$
 { $ZP D = \angle \text{Dist.}$ {
 { fr. Mer. = $2^{\circ} 26'$ {

Her hor. Parallax + $55' 51''$;

Refraction — $1' 36'' = + 54' 15''$.

Eq. fr. ap. for tr. Alt. therefore {
 the contrary from true to app. Alt. } — $54 \frac{1}{4}$



Remains the D's app. Alt. reqd. $28^{\circ} 4 \frac{1}{4}$.

For, if $a = s. PZ$ { — $c = s. P D$ } $x = \text{Cof. } \angle ZP D$.

$b = \text{cof. } PZ$ { $d = \text{cof. } P D$ } Then, $db - acx = \text{cof. } Z D$
 [= s. D b, required Alt.]

Per Theorem, P. 226, Royal Astronomer, always making the Sign negative for Degrees above 90. — Hence also this RULE for finding the

angular Distance from the Meridian, whose cof. = $\frac{db}{ac}$, from above. In Words —

From Sum Logs. of Sines deduct Sum of Logs. Cosines of a Place's Latitude and Planet's Declination, for Log. of Cof. of angular Distance of that Planet from the Meridian, at rising or setting Declination. For less than 90 Degrees Distance when the Latitude of a Planet is South; but more than 90 Degrees when the Latitude of the Planet is North.

To find the Time of the Moon's true Rising and Setting for the 13th of September, 1761.

Moon's diurnal Decrease of Declination from 13 to 14 at Noon = $5^{\circ} 22'$; her estimate semidiurnal Arc $5\frac{1}{4}^h$. — Whence $24^h : 5^{\circ} 22' :: 5^h \frac{1}{4} : 1^{\circ} 12'$, Diff. $\mathcal{D}$'s Declination.

Consequently, $10^{\circ} 45'$ S. Moon's Declination at Rising, and $8^{\circ} 21'$ S. her Declination at Setting, nearly.

Whence, by Tab. P. 203, Royal Astronomer.

Decl.	Lat.	Sem.di.			to be ad-	tr.S.di.
	Pl.	Arc.			ded to	Arc.
$10^{\circ} 45'$	$51^{\circ} \frac{1}{2}$	$5^h 8^m$	And $24^h : 43^m :: 5^h 8^m$	$: 9^m$	sem.diu.	$5^h 17^m$
$8^{\circ} 21'$	$51^{\circ} \frac{1}{2}$	$5^h 22^m$	$5^h 22^m : 10^m$		Arc.	$5^h 32^m$

$\mathcal{D}$'s Southing — $5^h 17^m$ $6^h 33^m$ $\mathcal{D}$ rises } truly on the 13th of
Hence, $11^h 50^m$ + $5^h 22^m$ $5^h 12^m$ $\mathcal{D}$ sets } Sept. 1761, Greenwich.

To find the Moon's apparent Rising and Setting; by Rule, P. 241, Royal Astronomer.

Moon's hor. Parallax then + $55' 45''$ } Hence, the $\mathcal{D}$'s true
Her horizontal Refraction — 33° } Zenith Dist. at her appar.
Her Alt. above true Hori- } + $22^{\circ} 45'$ } Rising or Setting, = $8^{\circ} 37'$, when her Center is
zon, at app. Rising } } seen to touch the visible
or $23'$ nearly. [Horizon.

Wherefore, To $10^{\circ} 45'$ Rising Decl. $\mathcal{D}$, answers $75^{\circ} 33' 30''$ ang. Dif.
 $8^{\circ} 21'$ Setting $78^{\circ} 43' 44''$ $\mathcal{D}$ fr. me.

And $360^{\circ} : 24^h 43^m : 75^{\circ} 33' 30'' : 5^h 11^m 15^s$ ap. sem. bef. South-
 $78^{\circ} 43' 44'' : 5^h 24^m 18^s$ [d. Arcs] aft. ing.

Hence, } — $5^h 11^m$ } = $6^h 39^m$ Rising Night,
 $11^h 50^m$ } + $5^h 24^m$ } = $5^h 14^m$ app. Setting $\mathcal{D}$ Morning, required.

☞ Compare which with White's Ephemeris, Sept. 14, 1761.

$3^h 59^m$ Setting . . Morning. Impossible.

Hence, what is found of the Times in all the Ephemerides yet published concerning the Moon's Rising and Setting are Nothing but an astronomical Fallacy, without any Regard to the Moon's horizontal Parallax, together with her horizontal Refraction, for determining the apparent Times at her apparent Rising and Setting; by allowing for her true Altitudes at those Times from the true Horizon, when her Center touches the sensible Horizon. — Or otherwise the Time of apparent Rising or Setting of the Moon's upper or lower Limb may be computed by allowing for her apparent Semidiameter.

And because no diurnal Motion is the Measure of the Moon's hourly Motion, whether of the Diff. of her Rising, Southing, and Setting, in Time, or of her Place, Declination, R. A. &c. in Degrees; therefore those respective Times and Places should be computed to the Hour before and after the Time and Place wanted, that it may be the more exactly proportioned from the hourly Difference.

The same otherwise answered.

To near	} South- ing Rising Setting	$\mathcal{D}$'s Place.	$\mathcal{D}$ Lat.S.	$\mathcal{D}$ Dec.S.	$\mathcal{D}$'s R. A. Deg.
esti-		$11^s 16^{\circ} 35'$	$4^{\circ} 37'$	$9^{\circ} 33'$	$349^{\circ} 27' 28''$
mate		$11^s 13^{\circ} 47'$	$4^{\circ} 43'$	$10^{\circ} 45'$	$346^{\circ} 53' 7''$
Times.		$11^s 19^{\circ} 21'$	$4^{\circ} 31'$	$8^{\circ} 23'$	$351^{\circ} 59' 10''$

Moon's

The GENTLEMAN and LADY'S

Moons R. A. Time.	Sun's R. A. Times
23 ^h 17 ^m 50 ^s	11 ^h 28 ^m 3 ^s
23 7 32	11 27 17
23 27 57	11 28 46

 Determine the intermediate Declinations and Right Ascensions in Degrees from the Longitude and Latitude of a Planet, by Tab. P. 251, and P. 23 and 24, Royal Astronomer, as above; being more near than proportioning the Declinations and Right Ascensions by the diurnal Differences.

For the exact Time of the Moon's Southing.

From R. A. ♃, in Time, at her Southing 23^h 17^m 50^s

Deduct R. A. ☉, in Time, at her Southing 11 28 3

Remains the exact Time ♃'s Southing, if } assumed
the Time of Southing is assumed right } 11 49 47 . 11^h 50^m
or Sun past Merid. . . Proof . . agreeing with the Time assumed.

For the exact apparent Time of the Moon's apparent Rising.

From R. A. Moon, at her Rising 346° 53' 7"

Deduct her true Arc from the Merid. 75 33 30

Rem. the R. A. of Mid-Heaven at ♃ Rif. 271 19 37

In Time . . 18^h 5^m 18^s P. 167, R. Astron.

R. A. Sun at her Rising *subt.* 11 27 17

Remains Time of Moon's Rising 6 38 1 . . assumed 6^h 39^m.
nearly agreeing.

For the exact apparent Time of the Moon's apparent Setting.

To R. A. ♃ at her Setting 351° 59' 10"

Add her true Arc from the Meridian 78 43 44

Sum, the R. A. of Mid-Heaven at her Setting 430° 42' 54"

In Time . . 28^h 42^m 52^s P. 167, R. Astron.

Deduct the R. A. ☉ at her Setting 11 28 46

Remains the Time of ♃'s Setting 17 14 6 assumed
1761, Sept. 14, Morn. 5 14 agreeing 5^h 14^m

N. B. The oblique Ascensions of the Moon, in Time, answerable to her estimate Place and Latitude, from a Table for the Place's Latitude and right Ascension of the Sun to those Times of Rising and Setting, is short, correct, and elegant; (see P. 408. R. Astron.) But this Method, by the right Ascension of the Mid-heaven, at Rising, Southing, and Setting, (subtracting the right Ascension of the Sun therefrom, respectively, at those Times, for the respective Time of the Rising, Southing, and Setting of the Moon) is the most universal and correct Method of any; as it equally serves for the Latitudes of all Places, without interfering with oblique Ascensions. See the other near Methods in the Royal Astronomer.

XVIII. QUESTION 199, answered by the Author of the Royal Astronomer and Navigator,

BY the Connoissance des Temps for 1761, according to M. Mayer's lunar Theory.

D's Pl. for Greenwich.								Moon's Lat.	
1761, May 18 ^d	0 ^h	Noon	. .	7	22	52	28	0° 39' 51" N.	
	18	12	Night	. .	7	28	56	13	0 6 41 N.

	Dif. 12 ^h	:	:	Dif. 6	3	45	0	33	10	
1761, May 18 ^d	10 ^h	observed	7	29	49	30	at unknown Meridian.			
Say, as 6° 3' 45"	: 12 ^h	Dif. Time ::	53	17	:	1 ^h	45 ^m	28 ^s	Dif. T.	
Add 12										

1761, May 18 th	{	Time at Greenwich	. . .	13	45	28	{	D having
		Time at unknown Merid.	10					same Pl.

Difference 3 45 28

Or, 56° 22' West Long. req.

Otherwise, As 12^h : 6° 3' 45" :: 2^h : 1° 0' 37"

7^s 28 56 13

D's Place at 10 at Greenwich	7	27	55	36
D's Place at 10 under dif. Merid.	7	29	49	30

As 6° 3' 45" : 12^h :: 1 53 54 : 3^h 45^m 27^s near-ly as before.

The Longitude comes out very nearly the same by the Royal Astronomer and Navigator; finding the Moon's Place within a Minute of a Degree; and consequently answering to within half a Degree of Longitude.

The ingenious Mr. Harris, of Bugbrook, depended on the Palladium lunar Tables, only fit for the Purpose of Longitude, when the extraordinary lunar Equation Tables are used; which will give the Moon's Place very near.

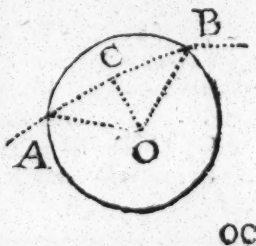
D's Pl. reduced to Greenwich.

M. De la Caille makes 7^s 22° 50' 0" } on the 18th of May
Connoissance des Temps 7 22 52 28 }
Mr. White in his Ephemeris 7 22 53 0 } 1761, at Noon.

Every minute Error in which creates ½ Deg. Error of Longitude; supposing the Moon's Place truly observed under a distant Meridian.

XIX. QUESTION 201, answered by Mr. Thomas Harris, the Proposer.

LET O be the Center of the Hills AB, an Arch parallel to the Horizon touching the Summits of the two Hills, at A and B. Then, in the Isocles and spherical Triangle AOB, we have, according to the Writers on Optics, AO=BO=54° 7', the Arch of a great Circle drawn from the exterior Sides of the external Bow; and the Side AB=45°; whence



$AB = 2y$ by the *Question*. Consequently, $BF = y \sqrt{3} = cy$; and $cy - d = IF = HA$, $\frac{1}{2}$ Diameter at the Head. Therefore $2cy - 2d =$ Head Diameter. Put $g =$ given Content 23517648. Then, by

a known *Theorem*, $\frac{8d^2 + 4c^2y^2 - 8cdy + 4d^2 \times 2y}{f = 3,81968} = g = 23517648$;

whence $16d^2y + 8c^2y^3 - 16cdy^2 + 8d^2y = fg$. $y^3 - \frac{2d}{c}y^2 +$

$\frac{3d^2}{c^2}y = \frac{fg}{8c^2}$. In Numbers, $y^3 - 180,130952y^2 + 24335,3705y$

$= 3742912,07136$. Hence $y = 167,93718$; and Head Diameter $= 269,75549$; Length 335,87436, confirming with Mr. *Thomson's* Solution. Q. E. I.

XXI. QUESTION 103, answered by Mr. Thomas Huntley.

IF the Proposer of this Question supposes the Ship to sail from Latitude $50^\circ 45'$ N. and to proceed with an uninterrupted Course W. by N. (the Ocean being supposed to flow quite round the Globe) she will at last arrive at the *North Pole*, and in her Passage thither will describe a proportional *Spiral* as has been demonstrated by Dr. *Halley* in the *Philos. Transac.* And as Mr. *Emerson* has proved in his Book of Navigation, that as Radius : to the Distance sailed on any Rhumb :: the Sine of the Course : to the Difference of Latitude ; therefore,

As S. $11^\circ 15'$: $90^\circ - 50^\circ 45'$ $\times 60 = 2355$:: S. 90° : 12071,33 Minutes of a Degree, which, at 6 Knots per Hour will be completed in $83^d 19^h 53^m 16^s$, nearly.

Remark by the Author. When the Difference of Latitude is considered in $69\frac{1}{2}$ Miles to a Degree, the Distance run will be in the same Miles.

Mr. Walker of Yorkshire answers it thus.

IT is demonstrated by the Writers on Navigation, that Parts of Rhumbs are every where to their correspondent Parts of the Meridians as Radius to the Cosine of the Course. — Therefore, As $78^\circ 45'$: Radius :: 2355 Miles (the Distance of $50^\circ 45'$ from the Pole, allowing 60 Miles to a Degree) : 12074,7 Miles, the required Distance run ; which at 6 Knots per Hour, gives 2012,45 Hours, for the Time in which the Ship will complete her Voyage ; nearly according to the Time by Mr. Huntley as above. W. W. R.

Chesterfieldensis answers the same differently.

The PRIZE-QUESTION answered by Chesterfieldensis.

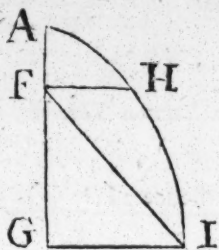
TO demonstrate that $FI = AF + \frac{FH - AF \times AG}{AF}$, in a, or any,

Conic Section.

In the *Parabola*.

BY the *Property* of the Curve, $FH = 2 AF$; and $FI = AF + AG$, which last Equation multiply by AF , then $FI \times AF = AF^2 + AF \times AG$. Now, because $FH = 2AF$, from above, $FH - AF = AF$, which put for its equal, in the former Equation, we have $FI \times$

$AF = AF^2 + \frac{FH - AF \times AG}{AF}$, which divided by AF , Then $FI = AF + AG = AF + \frac{FH - AF \times AG}{AF}$, the required Equation. Q. E. D.



In the *Ellipsis*, for which the *Demonstration* was designed, and for which it is most wanted, to find the Distance of Planets or Comets from the *Sun*.

Let $AF = a$, Semi-transverse $= b$; Semi-conjugate $= c$, Semi-parameter $= p$, the *Abscissa* $AG = x$. Then per *Conics*, $b : c :: c : p$, whence $bp = cc$, and $\sqrt{b^2 - c^2} = FG = x - a$. Also $FG + FA = \sqrt{b^2 - c^2} + a = b$; whence $\sqrt{b^2 - c^2} = b - a$; and $2ba - aa = c^2 = bp$; whence $b = \frac{a^2}{2a - p}$. — Now, $2b - a \times a :$

$$p^2 (FH^2) :: 2b - x \times x : GI^2 = \frac{p^2 \times \frac{2b - x}{a} \times x}{2b - a \times a} =$$

$$\frac{p^2 x^2 - 2pax^2 + 2pa^2x}{a^2} \text{ (putting for } b \text{ its Equal,) Also } FG^2 =$$

$$x^2 - 2ax + aa, \text{ from above. Then, per 47. e. 1. } GF^2 + GI^2 = FI^2 = \frac{p^2 x^2 + a^2 x^2 - 2pax^2 - 2a^3x + 2pa^2x + a^4}{a^2} = a^2 + 2 \times \frac{p - a}{a} \times$$

$$x + \frac{p - a^2}{a^2} \times x^2, \text{ whose Square Root } FI = a + \frac{p - a}{a} \times x =$$

$$AF + \frac{FH - AF \times AG}{AF}, \text{ the required Equation and Demonstration.}$$

The same is proved from the *Hyperbola*, changing the Signs. Q. E. D.

N. B. When FI becomes $= GI$, then $AF = AG = FH$, and the above Expression becomes $GI = AG$, a Circle; for $\frac{AG - AG \times AG}{AG}$ then vanishes.

But by the Nature of the *Parabola*.

$$a + x = FI \text{ above; } p = 2a, \text{ or } p - a = a, a + x \times a = aa +$$

*ax

*ax from above. Dividing by a , $a + x = FI = a + \frac{*ax}{a}$

$$(\overline{= a + x}) = a + \frac{\overline{p-a} \times x}{a} \text{ (putting } p - a \text{ for } *a) = AF +$$

$$\frac{\overline{HF - AF} \times AG}{AF}, \text{ the required Equation, as above.}$$

The Same answered by Mr. George Brown, of Portsmouth Common.

In the *Ellipsis* and *Hyperbola*.

PUT $AF = a$; Semi-transverse $= b$; Semi-conjugate $= c$; Semi-parameter $FH = p$, $AG = x$. Then, per Conics, $p = \frac{c^2}{b}$, and $2ba \pm a^2 = c^2$; and $b = \frac{c^2}{p}$. By Substitution, $\frac{2ac^2}{p} \pm$

$a^2 = c^2$; then will $2a - p \times c^2 = \mp p a^2$; $\therefore c^2 = \mp$

$\frac{p a^2}{2a - p}$; and $b = \mp \frac{a^2}{2a - p}$; $\therefore GI^2 = \frac{c^2}{b^2} \times \overline{2bx \pm x^2} =$

$$\frac{2p a^2 x - 2p a x^2 + p^2 x^2}{a^2} \text{ (by Substitution,) Then } GF^2$$

$= x^2 - 2ax + aa$; and per 47. e. 1. $GF^2 + GI^2 = FI^2 =$

$$\frac{a^2 x^2 - 2a^3 x + a^4 + 2p a^2 x - 2p a x^2 + p^2 x^2}{a^2}, \text{ whose square Root } FI =$$

$$a + \frac{\overline{p-a} \times x}{a} = AF + \frac{\overline{HF - AF} \times AG}{AF}, \text{ the required Equation.}$$

Q. E. D.

Mr. Brown observes that $FI = AF + \frac{\overline{FH - AF} \times AG}{AF}$, the Expression for the *Ellipsis*, reduces to $FI = AF + AG$ in the *Parabola*; (because $FH = 2AF$.) And because $AF = \frac{p}{2}$, $AG = x$, there-

fore $FI = \frac{p}{2} + x$. — Otherwise, $GI^2 = 2px$ (retaining the Substi-

tution in the *Ellipsis*) $FG = x - \frac{p}{2}$, then per 47. e. 1. $FI^2 = FG^2$

$+ GI^2$, i. e. $FI^2 = x^2 + px + \frac{p^2}{4}$, whose square Root $FI = \frac{p}{2} + x =$

$AF + AG$, as before.

The 12 Prize Palladiums, by Lot, fell to the indefatigable Chesterfieldensis.

A

A NEW METHOD of determining the LONGITUDE.

*** SOLD by Mr. WALLER and J. TOWNSEND, in Fleet-street,
Price 1s. 6d.

A New and Easy PRACTICAL METHOD of determining the LONGITUDE, at Sea and Land, to Half a Degree, from the Royal Observatory at Greenwich.

Also REMARKS on the speculative and fallible Methods that have been proposed for discovering the Longitude. — By the Author of the *Royal Astronomer and Navigator*.

Humbly offered to the Encouragement and Approbation of the Right Honourable the LORDS of the Admiralty and COMMISSIONERS of Longitude.

Some ACCOUNT of the METHOD.

THIS Method is by determining, from Observation, the right Ascension of the Moon's Center, at or near the Meridian of Observation, (where she has no Parallax in right Ascension.) Then, by a single Proportion, from an accurate Ephemeris of the Moon's right Ascension, computed from Tables in the *Royal Astronomer*, to Hours before and after the Moon's Southing at Greenwich, for certain Month-days in any Year, (similar to the *Almanac Nautique*) determine the Time at Greenwich when the Moon has the same right Ascension she had on or near the Meridian, at the Place of Observation.

WHENCE, The DISTANCE of the Meridian of OBSERVATION from the Meridian of Greenwich, or the Difference of Longitude will be the Difference of Time in Degrees, allowing 15 to an Hour, between the mean Times to the same right Ascension of the Moon, computed for Greenwich, and observed when she is upon or near to a distant Meridian. Which will be West or East Longitude from Greenwich, according as the Time, at the Place of Observation, is sooner or later than the Time at Greenwich, respectively.

EXAMPLE. The Difference of Longitude from Greenwich is required to a Place at Sea, where the right Ascension of the Moon's Center, on or near the Meridian of Observation, being $83^{\circ} 21' 18''$, at $11^h 48^m 32^s$, mean Time at Night, on which astronomical Day, by correct Ephemerides, the Moon's computed right Ascension, at 15^h past Noon, was $83^{\circ} 10' 55''$, and at 16 Hours past Noon, was $83^{\circ} 44' 40''$, for the Meridian of Greenwich.

$83^{\circ} 44' 40''$ R. A. at 16 } Hours past Noon }
 $83^{\circ} 10' 55''$ R. A. at 15 } at Greenwich. }

As dif. $33' 45'' : 60^m :: 10' 23'' : 18^m 28^s$, whence $15^h 18^m 28^s$
 $83^{\circ} 21' 18''$ R. A. observed. } $+ 15^h 00'$ } M. Ti. obs. $11^h 48' 32''$
 $10' 23''$ R. A. above } $15^h 18' 28''$ } Sooner $3^h 59' 56''$
 that computed at 15 Hours past Noon. } Or, $52^{\circ} 29'$ W. Long. required.

PRINCIPLE

PRINCIPLE of the METHOD.

THE Truth of the above Method depends on computing the Moon's Place, in general, for *Greenwich*, to within a Minute of a Degree, by the Tables in the *Royal Astronomer*. And as the Difference of a Minute in the Moon's right Ascension, or Place, corresponds to Half a Degree Difference in Longitude from *Greenwich*, therefore the Difference of Longitude, in general, may be determined at Sea, from that Meridian, within half a Degree; but more infallibly by Land, where a correct Meridian Line, and accurate Observation of the Moon's right Ascension upon or near the Meridian, with the mean Time of Observation, can be had.

The METHOD of observing the MEAN TIME, and correspondent RIGHT ASCENSION of the Moon, when she is on or near the Meridian, at the PLACE OF OBSERVATION, in her second and third Quarters.

The Meridian, at the Place of Observation, will be known, at Night, by the mean Time of a regulated Watch (corrected by Equation Tables and repeated Observation) when several fixed Stars south, and that to about 3 Seconds of Time. For, if we consider, that the Time of those Stars Southing, on each astronomical Day, at *Greenwich*, will be correctly known from *Ephemerides*, computed from the lunar Tables in the *Royal Astronomer*, for that Meridian, and consequently that an Allowance of about 10 Seconds of Time, sooner or later Southing of all Stars, answers to about 15 Degrees Difference of West or East Longitude from the first Meridian, respectively, there will be about 3 Seconds of Time (aforesaid) to 4 Degrees Difference of Longitude; without which Nearness the Longitude, in general, may be estimated, by *Ships Journals* at Sea. For 5 Seconds Error in the Time of a fixed Star's Southing answers but to $7\frac{1}{2}$ Degrees Difference in Longitude.

The mean Time of a fixed Star's Southing, that souths a little before the Moon, on a distant Meridian, being known, as above, within 3 or 4 Seconds of Time, at most, an Azimuth, or Seaman's Compass, contrived with the strongest magnetic Virtue (a hundred Times stronger than the common Sort) and a Sight-Index affixed thereto, for observing (directly or by Reflection) which Compass must be rectified, with its South Point directed to the Vertical, whereon the Star appears through the Sight-Index, at the mean Time of its true Southing by the Watch, in the Evening or Night of Observation.

Then, the Sight-Index must be retained in that Position to the South Point, till one of the Moon's Limbs appears through the Sights on the Meridian, or South Point of the Compass; when the Time of that Limb Southing, by the rectified Watch must be noted. — Now, the Difference of Time, or the Interval, in Seconds, betwixt the Time of the Star, and the Moon's Limb, coming to the Meridian, must be added, in Minutes and Seconds of a Degree, to the Star's right Ascension in Degrees, (had from the Catalogue, at P. 208, *Royal Astronomer*) for the right Ascension of the Moon's Limb observed at her Southing. — Then, adding the right Ascension of the Moon's Semidiameter, in Parts of a Degree (taken from *Ephemerides*) for the Day and Hour of observing the right Ascension of the Moon's right Limb;

or

or subtracting it from the right Ascension of the Moon's *left* Limb (according to which is observed) and the *Sum*, or *Difference*, will be the right Ascension of her Center, *respectively*. As the *adding* or *subtracting* the Moon's *Semi-diameter* (taken from the said *Ephemerides*) to, or from, the Time of her right or left Limb Southing, by the *rectified Watch*, will give the Time of her Center Southing, *respectively*.

But the right Ascension, and mean Time observed, at either the Moon's *upper* or *lower* Limb Southing, will be the *same* as the right Ascension and mean Time of her Center Southing.

The Time being truly determined to the Moon's *right Ascension*, truly observed, when she is *near* the *Meridian*, at the *Place of Observation*, without her being precisely upon it, will be as *sufficient* for determining the Longitude from *Greenwich*; because there will be *little* or no *Parallax* in right Ascension, if the Moon is observed at a *small Distance* from the Meridian.

To determine *which* right Ascension of the Moon, it is only required, that the *magnetic Compass* be made *strong enough* to retain its Position without Variation, from the Time the *Star* passes the *Vertical*, near the true Meridian, taken a little to the *Westward* thereof, till the Moon's Limb comes against the *Sight-Index* in the same Place, near the Meridian, where the *Star* was first observed. Which if it can be retained (as in calm Weather or smooth Sea is possible) all *Objection* to this Method of Longitude ceases. And therefore, the *less* Distance the *Star*, of known right Ascension, is taken to the *Westward* of the Meridian, the *less* Time the *magnetic Compass* rectified will have to vary from the *Vertical*, or near the *South Point*, to which it was first directed, against the *Star*, till the Moon's Limb arrives at the same South Point, by that *Compass*. And such *magnetic Compass* to take the Moon's Limb (*directly* or by *Reflection*) touching the same *Vertical* that the *Star* first did touch, the *mathematical Instrument Makers* must provide; by making it a *Hundred Times* stronger than the common Sort. Which, however, must be submitted to Dr. *Knighr's* superior Skill in *Magnetism*.

See the *St. James's Chronicle* from Saturday, August 22, to Tuesday, August 25, 1761, for Observations by Mercator, of Portsmouth, on this New Method by the Moon's right Ascension, for determining the Longitude, as *seton* in a Pamphlet on that Subject. In which Observations are considered some uncritical Remarks on the said Pamphlet, inserted in the *St. James's Chronicle* of June 23, preceding, signed J. I.—n, Ch—m, Kent; though done by a *Fergusonian Advocate* for Error, London.

See the said Pamphlet of the Longitude for a full Account of the Methods of determining the Longitude from Greenwich, and for several other Particulars relating to the Subject.

REMARKS

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REMARKS on observing the Moon's right Ascension and mean Time correspondent, when she is on the MERIDIAN.

IT is known how accurately these Observations can be made, within a few Seconds of a Degree, and to 1 Second of Time, in Places at Land, (as at the Royal Observatory at Greenwich) where a correct Meridian Line and Transit Instrument can be duly fixed — But, at Sea, this Observation cannot be made so correct as by Land, or Navigation would be equally perfect with the Moon's THEORY.

One Minute of a Degree Error in the Moon's right Ascension is equivalent to about 2 Minutes of Time Error in the Observation; because $2'$ of $2' 11''$ is about equivalent to 4 Minutes Error in the Time, as has been noted. Four Seconds of Time Error, in observing the Advance of the Moon in right Ascension eastward, (according to 12 Degrees Increase eastward in 24 Hours) is equivalent to 2 Seconds* only of a Degree, at a Mean; the Seconds of Time being double the Number of Seconds in a Degree, advanced in right Ascension by the Moon. — The Variation of the Needle while the Ship is going forward (for a few Minutes) betwixt the Time of a chosen Star (a little to the Westward of the Moon) coming to the Meridian and the Moon coming there after it, will be inconsiderable. —

There are nearer Methods of rectifying the Watch, by repeated Observation of the fixed Stars, in the Night, than by two equal Altitudes by Day.

Dr. Halley says, (at the End of Street's Astronomer) "Having by my own Experience found the Impracticability of all Methods (of finding the Longitude at Sea) but that derived from a perfect Knowledge of the Moon's Motion, I was ambitious, if possible, to overcome the Difficulties that attend the Discovery thereof.

"And first, I had found it only needed a little Practice to be able to manage a 5 or 6 Feet Telescope, capable of showing the Appulses or Occultations of the Moon to the fixed Stars by the Moon on Ship Board, in moderate Weather, (a Method attended with more complicated and impracticable Difficulty than observing the Moon's right Ascension on the Meridian) especially in the first and last Quarters of the Moon's Age, when her weaker Light does not so much efface that of the Stars. Whereas, the Eclipses of the Satellites of Jupiter, how proper soever for geographical Purposes, were absolutely unfit at Sea, as requiring Telescopes of greater Length than can be well directed in the rowling Motion of the Ship."

This great Man proceeds:

"Now, the Motion of the Moon being so swift as to afford us scarce ever less than 2 Minutes [eastward] for each Degree of Longitude, and sometimes $2\frac{1}{2}$, it is evident, that were we able to predict the true Time of the Appulse or Occultation, of a fixed Star in any known Meridian; we might, by comparing therewith the Time observed on board a Ship at Sea, conclude safely how much the Ship is to the Eastward or Westward of the Meridian of our Calculus." — And therefore the more easy and practical Method, by the Moon's right Ascension, will conclude so much the more certain and safe. And the celebrated Mayer, and other ingenious Foreigners, are (by the great Halley's Precept and Example) pursuing the Correction of the Moon's Theory, for the Purpose of Longitude, as preferable to all other

H

* There are about 4 Minutes of Time to $2' 11''$ Difference of the Moon's right Ascension; being each answerable to 1 Degree Difference of Longitude: So that 1 Minute Mistake in the Time will occasion an Error of but $33''$ of a Degree in the Moon's right Ascension, observed near the Meridian; being answerable to an Error of but a Quarter of a Degree in the Difference of Longitude: Because 4 Minutes of Time are allowed to 1 Degree.

other Methods. — The *Satellite Theory* is far more imperfect for that Use, and when it will be rectified by the Astronomers is uncertain. — The Places of the fixed Stars and their right Ascensions are indeed subject to some Doubt and Inconclusion; but no more when used with the *Moon's Theory* than with the *Satellite Theory*, in determining the Time of Night by Observation.

Finding the Time of the *Moon's Southing* evidently depends on the Time of a Star's Southing, before the Moon, as the Moon's right Ascension evidently depends on the Star's known R. A. Southing before the Moon. — There is no Trust to be put in the Time of the Moon's *Southing* independent of her right Ascension, at Southing; determined by the Southing of a fixed Star.

Another WAY of finding a MERIDIAN at SEA.

*** IN observing the Times of Eclipses of the Satellites of Jupiter, or when the Moon souths, we have a Meridian when the Star Alioth, or Cassiopea's Hip, is under the Pole, or above it; and then the Watch is to be set right.

The *Satellite Method* cannot take Place even by Land, better than the Method by the lunar Theory, till both these Theories are completed; and the latter is allowed to have the present Advantage, for being the correcter of the two. When the *Satellite Theory* is perfected, it can only have the Advantage of the Lunar Theory by Land.

Of the CELEBRATED HALLEY's DISSERTATION on the METHOD of finding the SUN's PARALLAX and Distance from the Earth, by the Transit of VENUS over the SUN's DISK on the 6th of June 1761, in the Morning. See Vol. I. P. 243, Motte's Abridgment of the Philosophical Transactions.

Of the supposed absolute Distance of the Sun from the Earth.

According to	Earth's Semid.	Parallax
Ptolemy and his Followers		"
Copernicus and Tycho Brahe	1200	15
Kepler — — —	3 00	10
Ricciolus — — —	7000	10
Hevelius — — —	5250	20
15" Parallax of the Sun	14000	15

But, because the Moon's Diameter is a little more than the fourth Part of the Earth's Diameter, if the Sun's Parallax should be supposed 15", the Moon would be larger than Mercury, or a secondary greater than a primary Planet; contrary to the Uniformity of the World's System.

Hence, observing a Mean, let the Sun's horizontal Parallax be . . . 12"

Then the Moon will be less than Mercury;

And the Earth bigger than . . . Venus.

According to 12 $\frac{1}{2}$ " Parallax of the Sun, his Distance from the Earth will be 16500 Semidiameters of the Earth.

Dr. Halley, 40 Years before he published this Dissertation, observed at St Helena (when he was observing the Stars about the South Pole) Mercury pass over the Sun's Disk, from the internal to the external Contact of both his Limbs forcing the Angle of interior Contact, without an Error of 1 Second of Time.

that Duration. But the *Difference* between *Mercury's* and the *Earth's* Parallax is so little, and always less than the *Earth's* or *Sun's* Parallax, wanted, that it cannot be determined from such Observations.

In the *Transit of Venus over the Sun's Disk*, her Parallax being nearly 4 Times more than the *Sun's* Parallax will cause sensible Differences in the Times which she will be seen passing over the *Sun*, at different Parts of the *Earth*. From which Differences, properly observed, the *Sun's* Parallax may be determined to a small Part of a Second of a Degree. And for which End only common *Telscopes* and *Clocks*, good of their Kind, besides a diligent Attention to the Observation, are required: There is Occasion for the Latitude of the Place or Hour of Observation, with Respect to the Meridian, to be accurately determined. It is sufficient that the *Clocks* be regulated according to the Motion of the Heavens; if the Times be well determined from the total *Ingress* of *Venus* upon the *Sun's Disk* to the Beginning of her *Egress*, or the Duration, from the internal to the external Contact, which may be ascertained to 1 Second of Time, as *Dr. Halley* asserts on his Experience.

Mr. Horrox, an *Englishman*, was the first who observed this *Phænomenon* since the Creation, in 1639, which was next observed in 1761, on *June* the 6th, in the Morning, *New Style*. The Middle was about 6 at *London*, above 4 Minutes South of the *Sun's* Center; its Duration almost 8 Hours, from 2 till almost 10.

Whence the *Ingress* could not be visible in *England*. But as the *Sun* was then in about the 16th Degree of *Gemini*, having almost 23 Degrees North Declination; this Transit was visible, without the *Sun's* Setting for the whole Duration, in all Parts of the Northern frigid Zone. The Inhabitants of the Coast of *Norway*, beyond the City of *Nidrosia*, which is called *Drontheim*, as far as the North Cape, might see *Venus* entering upon the *Sun's Disk*, and perhaps the *Ingress* of *Venus* upon the *Sun*, at Rising, might be seen by the Northern Scotch, and by the Inhabitants of *Schotland-Isles*, formerly named *Thule*. But when *Venus* will be nearest to the *Sun's* Center, he will be vertical to the Northern Shores of the Bay of *Bengal*, or rather over the Kingdom of *Pegu*. And therefore, in the adjacent Regions, as the *Sun*, at the Entrance of *Venus* on his *Disk*, will be almost four Hours towards the East, and as many to the West, when she quits him. The apparent Motion on the *Sun* will be accelerated by almost double the horizontal Parallax of *Venus* from the *Sun*; because she, at that Time, is carried with a retrograde Motion, from East to West, while an Eye upon the *Earth's* Surface is carried the contrary Way, or from West to East.

Suppose then the *Sun's* Parallax to be $12''\frac{1}{2}$, the Parallax of *Venus* seen from the *Earth*, or the *Earth's* Semidiameter seen from *Venus* at a mean Distance, will be $43''$; from whence deducting the *Sun's* Parallax, there will remain $30''$ at least, for the horizontal Parallax of *Venus* from the *Sun*, and therefore the Motion of *Venus* will be increased $45''$ at least by that Parallax, during the Time she passes over the *Sun's Disk*, at those Elevations of the Pole, in Places near the Tropic; and be more increased in Places near the Equator. *Venus*, at that Time, will move on the *Sun's Disk* nearly $4'$ of a Degree in an Hour; and thence 11 Minutes of Time, at least, must be allowed for $45''$ of a Degree; which Space of Time the Duration of this Transit will be shortened. From which Shortening of Time only we might draw a Conclusion concerning this Parallax we are in Pursuit of, provided the *Sun's* Diameter and *Venus's* Latitude were accurately determined. But, otherwise, an exact Computation cannot be expected.

Another Observation of the Duration of this Transit must therefore be taken in those Places where *Venus* will be seen in the Middle of the *Sun's Disk* at Midnight; viz. in Places under the opposite Meridian to the former, or about 6 Hours or 90

Degrees *West* of London; where *Venus* enters the Sun's *Disk* a little before her *Setting*, and goes off a little before her *Rising*. This will happen under the above mentioned Meridian, and where the North Pole is elevated about 56 Degrees. That is, in a Part of *Hudson's Bay*, near a Place called *Port-Nelson*. — For here, and in the adjacent Places, the *Parallax* of *Venus* will increase the *Transit's Duration* by at least 6 Minutes of Time. — Because, whilst the Sun from its *Setting* to *Rising* seems to pass under the Pole, those Places on the Earth's *Disk* will be carried from *East* to *West*, contrary to the Motion of the *Ganges*, and that with a Motion the *same Way* with the Motion of *Venus*; and therefore *Venus* will appear to move *slowly* on the Sun; and therefore to be longer in moving over his *Disk*.

If therefore this *Transit* could have been properly observed at both those Places, it is clear that the Duration would have been 17 Minutes longer, as seen from *Port Nelson* (where the *Transit* began before Sun-set, but was over before Sun-rise) than as seen from the *East Indies*. — Nor was it of Consequence whether the Observation was made at *Fort George*, otherwise called *Madras*, or at *Bencoolen*, on the Western Shore of the Island *Sumatra*, near the Equator. — A French Observer might station himself at *Pondicherry*, in about 12 Degrees Latitude. As a Dutch Observer might station himself at *Batavia* with Advantage, for advancing this Knowledge of the Heavens. — By many Observations taken by different Observers of the same *Phænomenon* at several Places, the Certainty would be confirmed by an Agreement, and to prevent the Disappointment by a cloudy Sky, that might happen to a few Observers in a few Places.

By this Method, the Sun's *Parallax* may be investigated to within its 500 hundredth Part, which will appear wonderful to some.

An accurate Observation being made in each of the Places mentioned, it is shewn, that the Durations of this *Transit* will differ from each other by 17 Minutes of Time; supposing the Sun's *Parallax* $12''\frac{1}{2}$.

But, if the Difference shall be found, by Observation, to be greater, or less, the Sun's *Parallax* will be greater or less, nearly in the same Proportion. And, because 17 Minutes of Time are answerable to $12''\frac{1}{2}$ Sun's *Parallax*, for every Second of *Parallax* there will arise a Difference of more than 80 Seconds of Time. From whence, if we have this Difference true to two Seconds, it will ascertain what the Sun's *Parallax* is to within a 40th Part of 1 Second; and therefore the Sun's *Diameter* will be determined to within its 500th Part, at least, if the *Parallax* be not found less than what is supposed: For 40 Times $12''\frac{1}{2}$ make 500.

This Conclusion is in Consequence of *Venus's Nodes* having remained in the same Places in the Year 1761 that they were in 1639.

If *Venus*, in 1761, should move over the Sun in a Path more to the South, (as she was found to do) it will shew that her *Nodes* have moved back among the fixed Stars; or if more to the North, that they have moved forward at the Rate of $5''\frac{1}{2}$ of a Degree in 100 Julian Years. For every Minute that *Venus's* Path shall be more or less distant than the aforesaid $4'$ from the Sun's Center, when the Difference of Duration of the *Transit* will be somewhat less than 17 Minutes of Time, by Reason of *Venus's* South Latitude; but greater, if, by the Motion of the *Nodes* forward, she should pass on the North of the Sun's Center.

But this *Parallax* of the Sun may be deduced from Observations of *Venus's Transit*, made somewhere in the East Indies in the Year 1761, both of the Ingress and Egress, being compared with those made at Home, in *Venus's* going off the Sun's Disk. Which is effected by applying the Angles of a Triangle, given in Specie, to the Circumference of three equal Circles.

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Of the TRANSIT of VENUS to happen in 1769.

*** FROM the foregoing *Hypothesis*, it follows that the Center of *Venus* should just touch the Sun's Northern Limb in the Year 1769, on the 3d of *June*, at 11 at Night. — That, on Account of Parallax, in the Northern Parts of *Norway*, entirely within the Sun, which then does not set to those Parts. But on the Coasts of *Peru* and *Chili* it will appear to travel over a small Portion of the setting Sun's Disk, and over a Part of the rising Sun's Disk, at the *Molucca* Islands, and in that Neighbourhood. — But if the *Nodes* of *Venus* be found to have a retrograde Motion, (as it is reasonable to believe, from some later Observations, they will) then *Venus* will be seen every where within the Sun's Disk, and will afford a much better Method for finding the Sun's Parallax by almost the greatest Difference in these Eclipses that can happen.

THE PALLADIUM AUTHOR.

TO the PALLADIUM AUTHOR.

S I R,

Notwithstanding *Ferguson's Objections*, in his *Transit* Pamphlet, to the *Dissertation* on *Venus's Transit*, Dr. *Halley* is looked upon, by all Judges, as the greatest *Astronomer* England ever had, and is justly celebrated as such in this and other Kingdoms. — How indefatigable was he in the *Voyages* he made, and particularly in that to the *East-Indies*, from whence he brought a *Catalogue* of the Places of the Southern fixed Stars (not visible in our Part of the Globe) from his own curious Observations in the Island of *St. Helena*, and his accurate Discoveries of the Variation of the magnetic Compass, in that Quarter of the World; as well as in the American Quarter, in his Voyage to *Hudson's Bay*. And how elaborate was he afterwards at the *Royal Observatory*, in observing the Motions of the *Moon*, and her meridional Transits, in order to correct and settle the *lunar Theory*, as he had done that of the other Planets, to as great a Degree of Accuracy as could be expected in his short Limits of Time. The late remarkable Transit of *Venus* testifies the Correctness of his original Observations and the Strength of his Judgment, by so near a Correspondency of that Transit with what was observed of the central Egress, and a just Computation of the same by *Parallaxes*, from his Tables. But this celebrated *Astronomer* wanted such Observations as the late Phenomena of *Venus* afforded, to ascertain her apparent Diameter, and to render her Theory and the Tables of the Planets Motions more perfectly complete; as the Completion of the astronomical Science may yet be the Business of Ages to come.

I am, &c. T. COWPER.

See *St. James's Chronicle* from Saturday, September 5, to Tuesday, September 8, 1761, for *Mercator's Account* of *De la Caille's Method* of observing the *Moon's* Parallax, which Mr. *Ferguson* in his *Transit* Pamphlet published as his own. — See also *Mercator's Remarks* in the same Paper on Mr. *Ferguson's Errors* in his *Transit* Pamphlet, who pretends to correct Dr. *Halley*.

AS the Transit of *Venus* over the Sun, on *June 6th*, 1761, in the Morning, is a most interesting Subject, employing the Attention of the ablest Astronomers in Europe, for determining the Sun's horizontal Parallax, and thereby settling the Dimensions of the whole Solar System, at this Time, the following are the Observations, made at and near London, of that Transit.

The

The Transit of Venus over the Sun, according to different Observers, on June 6, 1761, Morning, apparent Time.

Places of Observation.	Observers.	Internal	External	Dis. in moving over ♀'s Diam.
		Contact. H. M. S.	Contact. H. M. S.	
D. of York's, Leices. Fields, At Greenwich,	Short, Optician, Bradley's Assistant	8 18 16½	8 37 0½	18m 44s
At Hackney 12" Time Long. fr. Greenwich, or 3' of a Deg.	Dolland, Exeter- Change,	8 19 0	8 37 15	18 15
At Spital Fields Square,	Canton, F. R. S.	8 18 44	8 37 0	18 16
At Fleet-street,	Mudge,	8 19 50	8 38 13	18 23
		8 19 6	8 36 36	17 35
Equation of mean to apparent Apparent to mean		Time. } + 1.51		

* * From the above Observations it appears, that there is a Difference in taking the apparent Time and Duration of a Phenomenon, observed at the same Place, by different Observers and Instruments, or even with the same Instruments, which Mr. Short, Optician, in Surry-street near the Strand, London, accounts for, by enumerating five Causes thereof, as follow :

1. The different magnifying Powers of the Telescopes used.
2. The different Lengths of those Telescopes.
3. The different Goodness of Telescopes of the same Length.
4. The Different Practice of Observers, in using those Telescopes.
5. The different Eyes.

Remark by Newtonienfis. — Mr. Short need not assign any Cause for the different Time, by different People in observing the Transit of Venus, but the true one — which is, that a great many Pretenders attempted to make Observation who knew not how to perform it; and then, to look considerable, gave their Mistakes to the Public. — My Time of the Transit (over the Sun's Edge) differs from Mr. Short but by 5 Seconds, and I suppose his to be accurately made. In some they differ above a Minute, which shews they either wanted Eyes or Understanding.

THE following true Computation and Representation of the late Transit of Venus, for Bencoolen in the East Indies, (whither our Astronomers were sent) will correct the Mistake of Mr. Ferguson, in his Transit-Pamphlet, and most of the Ephemerides and Almanac Writers, who have quite misrepresented the apparent Passage of Venus over the Sun's Disk.

Mr. Ferguson makes the Duration of the Transit an Hour and a Quarter less than Dr. Halley, if she had passed 4, instead of about 10, Minutes of a Degree below the Sun's Center, at the Middle of the Transit. — Therefore, her Parallax from the Sun will be as much diminished at Places on the Earth's Surface, at the Beginning and End of the Transit. That the Difference of Duration, as seen from the Ganges, or from Pondicherry, Bencoolen, or Batavia, will not amount to 11 Minutes of Time, from the Quantity of its Duration as seen from the Earth's Center.

On June 6, Venus's Transit at Bencoolen, with Parallaxes.

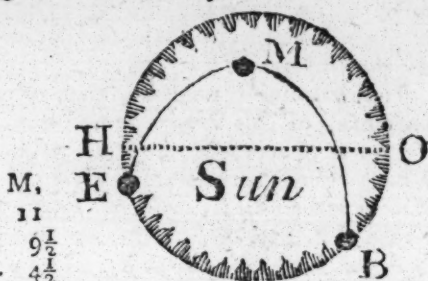
	H. M.	
Central Ingress . . .	9 0	Morning.
Middle . . .	9 }	Afternoon.
Central Egress . . .	3 18	

Representation

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Representation of her Passage over the Sun's Disk.

● Venus.
 B. Beginning.
 M. Middle.
 E. End.
 HO. Horizontal Line.



Venus { Below the Sun at Central Ingress, 11
 Above the Sun at Middle . . . 9 $\frac{1}{2}$
 Below the Sun at Central Egress . . . 4 $\frac{1}{2}$

Venus is in the nonagesimal, or nintieth Degree of the Ecliptic, at the Middle of the Transit at *Bencoolen*.

Hence it is observable, that the apparent Path of *Venus* over the Sun's Disk at *Bencoolen*, is in a Curve Convex upwards, begins at the Right Hand and ends at the Left, just the contrary to what it appeared in *England*. And though the above Representation is drawn from a Calculation of the *parallactic* Angles and visible Latitude of *Venus*, at the respective Intervals, at *Bencoolen*, upon the same Principles as are hinted in the *Royal Astronomer and Navigator*, and as are shewn in the *Practical Method* of determining the Longitude, the Manner of its Appearance there will agree with the above Representation. In which Pamphlet of the Longitude, my Representation of the Transit at *London* was drawn true, notwithstanding Mr. *Ferguson's* Objections in *St. James's Chronicle* of June 23, 1761, to the contrary. Many Hundreds of Persons, who saw that Transit, can testify, that it agreed with my Representation; and that the Representation by Mr. *Martin*, in his Magazine, and most others in those monthly Productions, disagreed.

I saw the Transit in Company with several Gentlemen at *Wappenham* in *England*, with a Nine-feet refracting Telescope. It was cloudy there till about seven Minutes after five, when *Venus* appeared on the lower Part of the Sun's Disk, a little to the East (or Left) of the Place marked *Middle* in the Type inserted in the said Longitude Pamphlet. The Half Sheet, from whence that Representation was copied, was laid before a Number of Persons of Distinction, who saw that Transit, and all agreed that it corresponded, and that the Appearance was far different from what it was represented by Mr. *Martin*, *Ferguson*, and others.

The visible Path of *Venus* over the Sun's Disk, appeared to be in a Curve, a little concave towards the Sun's Center, as described at P. 52, in a Pamphlet of the *Practical Method* of determining the Longitude.

The End of this curious Transit at *Wappenham*, was about 38 Minutes after 8, which corresponded, very nearly, with my Computation aforesaid, from Dr. *Halley's Tables*.

The chief Disparity that occurred to me in that Computation, was in the Time from the *Emerfion* (at external Contact) to the End of the Transit, which was about 18 Minutes of Time: Whereas, by taking *Venus's* apparent Semi-diameter (according to Dr. *Halley's Hypothesis*) at 41 Seconds of a Degree, it made that Interval 26 $\frac{1}{2}$ Minutes of Time. But, by the most accurate Observation, *Venus's* apparent Semi-diameter, taken by a *Micrometer*, was but 27 Seconds of a Degree. Therefore, as 41 Seconds of a Degree are to 26 $\frac{1}{2}$ Minutes of Time, so are 27 Seconds of a Degree to about 18 Minutes of Time from the internal to the external Contact of this curious and useful Transit.

Hence, if I had taken 27 Seconds, instead of 41, for *Venus's* apparent Semi-diameter, (which could not be ascertained so well as by Observation) the Time from

from *Emerſon* to the End, and the End alſo, would have agreed to a great *Accura-*
cy with the Computation, as inſerted in the ſaid Longitude Pamphlet, from
Halley's Tables, notwithstanding what Mr. *Talbot* objects to thoſe *Tables* in Mr.
Martin's Magazine for *July* laſt.

Hence it may be obſerved, that of all the *Delineations* and *Sketches* that have
 been made of this *Transit* for *London*, none have truly exhibited the Place where
Venus was to appear on the Sun's *Disk*, at the Time of their Riſing, except what
 I have offered to the Public. Which Representation I drew by the *parallaſtic*
 Angles and *viſible* Latitudes of *Venus*, as before ſuggeſted, in the Manner as men-
 tioned at P. 102, *Royal Aſtronomer and Navigator*.

See the Longitude Pamphlet, where ſhould be printed,

		M. S.
Viſible Latitude of <i>Venus</i> at	Riſing	9 9
	Viſible Longitude	10 17½
	Central Egrefs	11 45

Making the Curve as there represented.

T. COWPER,

From *Silverton*, in *Whittleberry Foreſt*,
 between *Towceſter* and *Brackly*, Au-
 guſt 3, 1761.

Other OBSERVATIONS (in the *Math. Mag.*) of the End of *Venus's* late *Transit*,
 with the magnifying Powers of the Telescopes uſed.

At the Royal Obſervatory at	Apparent Time.	App. Time.	His R. H.
<i>Greenwich</i> , with a Magni-	8 ^h 19 ^m 0 ^s int. <i>Contact</i> .	8 ^h 18 ^m 22 ^s ½	D. of <i>York's</i>
fier of 55. Mr. <i>Green</i> .	8 37 9 total Egrefs.	8 37 4 ½	Magnifier
			of 140.
At <i>Spital Square</i> , with a	8 18 39 int. <i>Contact</i> .	8 0 20	<i>Leſkard</i> in
Magnifier of 55. Mr. <i>J.</i>	8 37 2½ total Egrefs.	8 19 23	<i>Cornwall</i> ,
<i>Canton</i> .		Rev. Mr. <i>Hay-</i>	Lat. 50° 26'
		<i>don</i> .	42". Mag-
			nifier 55.

Some of the above are altered from thoſe we received.
 * None of theſe Obſervers ſaw any *Satellite* of *Venus* on the Sun's *Disk* before
 or after the *Transit*. — Though the *Satellite* of *Venus* is ſaid to be ſeen on the Sun,
 on the Day of the *Transit* at *St. Neot's* in *Huntingdonſhire*, moving in a Track
 parallel to *Venus*, but nearer the *Ecliptic*. That *Venus* left the Sun's *Disk* at 31^m
 paſt 8, and the *Satellite* at 6^m paſt 9.

Of the NEW SATELLITE of VENUS lately aſcertained.

MR. *Montaigne*, one of the Members at *Limoges*, in *France*, on the 3d of *May*,
 1761, obſerved at half an Hour after 9 in the Morning a fine ſlender *Crescent* about
 20 Minutes diſtant from *Venus*. On *May* 4, he obſerved the ſame again, farther
 from *Venus*. On the 7th of *May* he ſaw the ſame *Satellite* again, at half an Hour
 paſt 9 in the Evening a third Time; being then above *Venus* on the North Side,
 after changing its Poſitions each Time obſerved. — This *Satellite*, by the Teſti-
 mony of M. *Baudouin*, had been ſeen before by M. *J. D. Caſſini* on the 25th of
January, 1672, N. S. from 6^h 52^m to 7^h 2^m in the Morning. And was again
 ſeen by *Caſſini* the 8th of *September*, 1686, a Quarter paſt 4 in the Morn. About
 50 Years after, Mr. *Short*, Optician, of *Surrey Street* in the Strand, *London*, ſaw
 the ſame on the 23d of *October*, 1740, at Sun-riſing with a reflecting *Telescope*, at
 10' Diſtance from *Venus*, meaſured by a *Micrometer*. Its Diameter appeared one
 third of that of *Venus*, or rather leſs. He ſaw it for the Space of an Hour that
 Morning,

Morning, till he lost Sight of it in the Sun's increasing Light. See *Philos. Trans.* No. 459, & *alid. Math. Mag.* No. IV. 1761, for Particulars.

This *Satellite* is supposed to have accidental or periodical Returns of Light, which renders it visible at certain Times only. As there is a like Vicissitude in the 5th *Satellite* of *Saturn*, sometimes looking bigger than the 3d, and decreases its *Size* and *Splendor* till it vanishes in the eastern Part of its Orbit.

M. *Montaign*, from his Observations of this *Satellite* of *Venus*, determines its *synodic* Revolution 9 Days 7 Hours.— The apparent *Radius* of this *Satellite's* Orbit 23 Minutes: *Venus* from the Sun being as 100 to 215 of the Sun from the Earth. — That when *Venus* is at her mean Distance from the Earth, or the same Distance as the Sun, the apparent *Radius* of her Orbit will be 11' only. — When *Venus* passes over the Sun, this *Satellite's* greatest Elongation will be 37', when the Diameter of *Venus*, seen from the Earth, will be $1\frac{1}{2}$ Minute; and the *Satellite's* Distance from *Venus* will be 60 of her Semi-diameters, the same as the Moon's Distance from the Earth in its Diameters. The *Node* of this *Satellite* about 22° in *Virgo* and *Pisces*. — Which *Satellite* might be seen in the Sun's Disk at the End of the late Transit of *Venus*, passing over it to the Southward. That *Venus* having a *Satellite* is no longer a Doubt, as M. *Montaigne* at *Limoges* confirms by his 4th Observation of the same, on the 11th of May at 9 in the Evening; making its Revolution about 12 Days, and but about 50 Diameters of *Venus* distant, making the Mass of *Venus* equal to the Bulk of the Earth; being an essential Element in Astronomy, entering into different Computations and *Phænomena*. Which Opinion and Facts are certified by l'Abbé *De la Caille*, and M. *De la Lande*, May 30, 1761, done at the *Royal Academy of Sciences* at *Paris*.

Universal and most Easy SOLUTION of the Keplerian PROBLEM.

According to P. 96, *Royal Astronomer*.

LET E = Length of the Arc of eccentric Anomaly, x = its natural Sine, (Radius = 1) e = Eccentricity of the Orbit, (Transverse = 1) M = Length of the Arc of mean Anomaly, according to that Radius.

Then, by the Property of the Ellipsis and a Planet's Motion in its Orbit, xe will be the Length of the Arc of Difference between the mean and eccentric Anomalies.

Then, if the mean Anomaly be less than 180°, subtract this Difference therefrom, otherwise add it thereto, for the eccentric Anomaly. Consequently, by Transposition, In the $\left. \begin{array}{l} 1^{st} \\ 2^{d} \end{array} \right\}$ Case, $E \pm xe = M$, correctly. And Radius being = Arc of 57° 29' 5779 Degrees; therefore $E^\circ \pm xe \times 57^\circ 29' 5779 = M^\circ$, (where $xe \times 57^\circ 29' 5779$ = Difference, in Degrees, between the eccentric and mean Anomalies: For, as 1 Rad. : 57° 29' 5779 :: xe : $xe \times 57^\circ 29' 5779$.) The best Solution of which Equation is the best Solution of the Keplerian Problem.

First to find the Degrees of eccentric Anomaly.

You may readily determine it by the Pen and a Table of natural Sines from the last of the above Equations, by assuming two different eccentric Anomalies, and adding or subtracting the respective Differences, and proportioning the Errors above and under the Degrees of mean Anomaly given, so as to assign a near eccentric Anomaly, which may be more correctly determined by a second Operation.

Or by a more DIRECT Way of SOLUTION.

1. Say, As the *Aphelion* is to the *Perihelion* Distance, so is *Tang. half mean Anomaly*, to the *Tangent* of a fourth Arc (nearly $\frac{1}{2}$ true Anomaly) which added to half the mean Anomaly will be a first eccentric Anomaly; as the Difference of those Arcs will be a near Difference between the mean and eccentric Anomaly, requiring Correction. Which, in Orbits not very eccentric, or where the mean and eccentric Anomalies differ not above 3 Degrees, will be sufficiently correct.

2. In Orbits very eccentric, add the *Log.* of Eccentricity to the *Log.* 1,7581227 (being the *Log.* 59,295779 to Degrees answerable to Radius) for a constant Logarithm = B, to which add the *Log. Sine* of the first approximated eccentric Anomaly, and take the Number of Degrees correspondent to the Sum = D, and subtract in the 1st Case, or add in the 2d Case, from and to the given Degrees of mean Anomaly, for a second approximated eccentric Anomaly. Whose *Log. Sine* is to be added to the constant Logarithm B, as before, for the Logarithm D, of a new Number of Degrees of Difference, to be subtracted in the 1st, or added in the 2d Case, from and to the given Degrees of mean Anomaly, for a more correct eccentric Anomaly; and so repeating the Operation till two following Differences of Anomaly come out alike, when the last determined eccentric Anomaly will be correct.

Then, to find the true from the eccentric Anomaly.

Say, as Square Root of the *Aphelion* Distance, is to the Square Root of the *Perihelion* Distance, so is the *Tangent* of half the correct eccentric Anomaly, to the *Tangent* of half the true Anomaly; which doubled, is the true Anomaly required.

See P. 115 and forward, Royal Astronomer, for determining other Requisites of elliptical Orbits.

EXAMPLE I. The mean Anomaly of Mercury being 130° , 216181 = 130° 12' 58" 15", and the Eccentricity of the Orbit, 20589 to the mean Distance, or semi-transverse Unity, required from thence first the eccentric and then the true Anomaly of that Planet?

	Logarithms.
As Aph. Dist. 1,20589 co.	9.9186923 } Sum
To Perih. Dist. 0,79411	9.8998807 } = A.
So Tan. $\frac{1}{2}$ M. Anom. 65° 6' 29" . . .	10.3334692
To Tan. fourth 54 49 50	10.1520422

Sum, 1. Eccentr. Anom. 119 56 19 } to be corrected.
 Dif. 1. the Dif. betw. M. and Ecc. An. 10 6 29 }

	Radius 57° , 295779	1.7581227
	Eccentr. 20589	9.3136353
M. Anom. 130° 12' 58"	Const. Log. . .	1.0717850 = B
1. Ex. An. 119 56 19	Log. Sine . .	9.9377989 +
Dif. — 10 13 21	10° , 22249 . .	1.0095569 = D
2. Ex. An. 119 59 37	Log. Sine . .	9.9375635 + B
Dif. — 10 13 1	10° , 21695 . .	1.0093215 = D
3. Ex. An. 119 59 57	Log. Sine . .	9.9375343 + B
Dif. — 10 12 59	10° , 21637 . .	1.0092923 = D
4. Ex. An. 119 59 59	Log. Sine . .	9.9375318 + B
Dif. — 10 12 58	10° , 21621 . .	1.00928 = D
5. Ex. An. 120 0 0	correct. Now say,	

As $\sqrt{\text{Aph. Dist. } 1,20589}$ Is to $\sqrt{\text{Perih. Dist. } 0,79411}$ So Tan. $\frac{1}{2}$ Ex. An. 60°

9.9593461 co.

9.9499404

10.2385606

To Tan. $\frac{1}{2}$ true An. $54^\circ 34' 10'', 27$ 10.1478471Doubled . . . 109 $8^\circ 20', 54$ the true Anomaly, required.

The Advantage of the foregoing Method beyond all others is, if any Error should happen in the Operation, the repeated Operation will always correct it, and prove the Truth at last.

* * * Compare the foregoing universal Method with what is shown at P. 6 and 7, No. I. Mathematical Magazine. Where, besides the Trouble of finding the Log. Sine and Tangent to Degrees and 6 or 7 Places of Decimals, unreduced to Minutes and Seconds, different to the above Example, there is the Trouble of correcting the Difference between the half given mean Anomaly, and the fourth Arc, by adding the Log. for Degrees of Radius, to the Log. Sine of that Difference, to give the Difference betwixt the 1st eccentric Anomaly and the given mean Anomaly. Which 1st eccentric Anomaly is the same as our 2d; and their 2d the same as our 3d eccentric Anomaly, &c.

But this Method in the said Mathematical Magazine, printed (for J. Wilkie, in St. Paul's Church Yard) 1761, it seems, is like Professor Steward's, published sometime since in the Edinburgh Essays.

A more direct Approximation in the Orbits of Mercury and Mars.

(See Bottom of P. 88, Royal Astronomer.)

	Logarithms.
As Radius 1 . . .	0.0000000
Is to Cosine of 2d exc. An. $119^\circ 59' 37''$	9.6988861
So the Eccentricity of the Orb ,20589	9.3136353
To a Fraction* ,1029263 —	9.0125214

Rem. ,8970737 . . . Log.	9.9528281 —
Dif. 1st and 2d Ex. Anom ^s . $3' 18'' = ,055^\circ$	8.7403627
Error, $+ 3' 41'' = ,06131^\circ$	8.7875346 Rem.
$119^\circ 56' 19'' = 1st \text{ Ex. Anom.}$	

$120^\circ 0' 0'' = \text{correct eccentric Anom. reqd.}$

Or, ,897 $3' 18'' (+ 3' 41'', \text{ Error, as above.}$

* Which Fraction, when the mean Anomaly is above 270° ? adds

Or less than 90° } to

Otherwise subtracts from . . . 1

And the Difference of 1st and 2d eccentric Anomalies divided by that Sum or Difference of the Fraction and Unity, the Quotient will give the Error of the 1st eccentric Anomaly to a great Nearness.

Which Error subtracts from the 1st eccentric Anomaly in the first and third Quadrature; but adds to it, in the second and fourth, for the correct eccentric Anomaly.

The above Approximation will be the nearer the farther any two next eccentric Anomalies are from the 1st eccentric Anomaly: Using the latter as second and former as the first eccentric Anomaly; taking their Difference, and operating as above. —

But the foregoing Approximation will not answer in the very eccentric Orbits of the Comets, such as in the Comets of 1680, (as may be tried by taking 3 and 2 eccentric Anomalies for 2d and 1st, viz. $80^{\circ} 22' 6''$ and $76^{\circ} 24' 14''$, in P. 39, *Palladium* 1757) except the Difference of the two next eccentric Anomalies is a few Minutes only; as in Mercury's Orbit is exemplified.

EXAMPLE II. The mean Anomaly of Mars being $64^{\circ} 59' 17'' = 64^{\circ} 35' 30''$, with Eccentricity 0,09254. Required the eccentric Anomaly?

(See Math. Mag. I. P. 7.)

To the Log. A	9.9193902
Add Tan. $\frac{1}{2}$ M. An. $32^{\circ} 17' 45''$	9.8007665
Tan. 4th	$= 27 \ 41 \ 57$
	9.7201567 Sum.

Sum, 1. Ex. Anom.	59 59 42	
M. Anom.	$64^{\circ} 35' 30''$	Log. Rad. Deg. and Eccen ^y 0.7244522 = B
1. Ex. Anom.	59 59 42	Log. Sine 9.9375087 +
	$- 4 \ 35 \ 30$	4,591560 . . 0.6619609 = D

2. Ex. Anom. $60^{\circ} 0' 0''$ which is the correct eccentric Anomaly, required, by the universal Method; without any farther Approximation.

* * Hence the FOREGOING METHOD of solving the Keplerian Problem surpasses all other Methods whatsoever that have been, or can be, invented, for Universality, Ease, Speed, and Correction; because it gives a direct Solution in all the planetary Orbits except Mercury's; and in that and the cometary Orbits, it approximates with all desirable Speed and Facility in a methodical Way, — Tables of eccentric Anomaly computed to every tenth, or less, Eccentricity, would not give so quick and correct a Solution as the foregoing universal Method, solving the accurate Equation proposed in the best Manner,

TABLE of the ECCENTRICITIES of the Planetary and Cometary ORBITS to Radius or Semi-transverse 1; with constant Logarithms for Practice, in determining the Requisites of those Orbits, from our Stating.

Planets.	Eccentricities to the mean Dist. 1.	Logarithms of Eccentricities.	Logarithms called A.	Logarithms called B.
Saturn . . .	0.057003	8.7558977	9.9504342	0.5140204
Jupiter . . .	0.048219	8.6832182	9.9580851	0.4413409
Mars . . .	0.091639	8.9667939	9.9193035	0.7249166
The Moon . . .	0.055050	8.7407573	9.9521349	0.4988800
The Earth . . .	0.016830	8.2265999	9.9863629	9.9847226
Venus . . .	0.006981	7.8439176	9.9939364	9.6020403
Mercury . . .	0.205890	9.3136353	9.8185730	1.0717580
Comet, Novem. 1680. Period 575 Years	0.9999107	9.9999613	5.6498408	1.7580840
Com. Sep. 1682. (Period 76 Yrs) of 1738		9.9856024	8.2194386	1.7437251

of

Of the LAST COMET.

THIS last Comet, predicted by the great Astronomer Dr. Halley, at the End of 1758, or Beginning of 1759, was before observed in 1682 by all the Astronomers in Europe; and in 1607 by Kepler and Longomontanus; in 1531 by Apian; and, according to History, in 1456, 1380, 1305, 1230, 1005, 930, 550, 399, 323, &c. (*Lubienecii Theatrum Cometicum.*) It was observed in Saxony, according to Halley's Prediction, in December 1758, and after in January and February, April and May 1759, following, in France. The last computed Period 27352 Days, but 27937 by others. Or its mean Period 27700 Days; being uncertain from the Action of Jupiter and Saturn upon this Comet.

In 1759.	In 1682.	} The Results in 1759 agreeing with Dr. Halley's Tables of the Mot. of Comets; those Tables of Comets therefore merit unceasing Applause!
Place of the Node . . . 1 ^s 23° 48'	1 ^s 20° 48'	
Place of Perihelion . . . 10 3 16	10 1 36	
Inclination of its Orbit . . . 17 39 $\frac{1}{2}$	17 42	
Log. Perihelion Dist. . . 9.766039	9.765296†	
Passage of its Perihelion, 12th of March, 13 ^h 41 ^m , mean Time.	14th of Sept. 21 ^h 31 ^m	

† Perih. Dist. .5825, Semi-transv. 17,3635.

(See *Connoissance des Temps* 1761, from P. 113 to 216.

Our Astronomers (since the illustrious Halley, of whom all Foreigners speak with Applause) have given us no Account of this Matter, that we have seen.

OF MINUTE [or HAIR-SPLITTING] ASTRONOMY: The common or greater PART, being supposed, so far, correct.

BESIDES a considerable annual Improvement in the Moon's Place, being computed from Mayer's Tables for every 12 Hours, by M. De la Lande in the *Connoissance des Temps*, (a Performance every English Astronomer may regret for the like not being encouraged in his own Country) there are contained, in that elaborate Work, small Equation Tables of several Kinds, to correct the Results by the common Rules of Astronomy. First, a large Equation Table, of Degrees and Minutes, for correcting the Longitude of the Moon's Node, according to its mean Argument, for finding the Nutation in an Ellipse. — Then, according to that corrected Argument of the Node, to reduce the mean right Ascension, by a small Equation of Seconds of Nutation. Then, a second Equation of Nutation, in right Ascension, of the Stars and Planets, according to right Ascension or Longitude of the Moon's Node. Then, a small Equation Table, of Nutation in Declination, of the Stars and Planets, according to their right Ascension or Longitude of the Moon's Node. — Then, a small Equation Table, of Nutation in Longitude, (according to the Argument of the Longitude of the Moon's Node) for reducing the mean to the actual and apparent Longitude of the Stars. — Then several small Equation Tables of Aberration, (caused by the Motion of Light and of the Earth in its Orbit) and Nutation or Deviation, (caused by the Poles moving in an Ellipse) in right Ascension and Declination, to 24 noted fixed Stars, of given Longitude, Latitude, right Ascension, and Declination, (with their annual Variations) according to the Sun, or Node's Place; this Aberration and Nutation, in Seconds, adding or subtracting, like all other Equations. — Then, the right Ascension, Declination, and annual Variations, to 160 eminent fixed Stars, corrected to the Beginning of 1760. — Then secular Variation, by a Number of Seconds, in the Latitude and Longitude of Stars. — Then, Aberration Table of the 6 Planets, according to their Distance from the Sun, for reducing their mean to apparent Longitude. — Then, a general Aberration Table of the Planets, according to their respective

respective Distances from the Earth in Parts of the Sun's Dist. 10, and their daily Motion. These 2 last Tables, with *Simpson's Demonstrations and Rules of Aberration, &c.* in his pure and mixed *Essays*, are reprinted in the *Math. Mag.* No. I. containing a Variety of original Pieces, (as its Title expresses) yet lived but 5 Months. — *Poor Thing!* — Then, an Equation, by *Seconds* of Time, to the true Noon, by the Method of equal and corresponding Altitudes, according to the Sun's Longitude, and Interval of Time between a fore and after Noon, Observation, for Latitude of Paris. — The Increase of the Moon's Diameter at several Altitudes, according to her present Distance from the Zenith (where is no Variation) and horizontal Diameter. — But M. De la Lande has omitted the Moon's Motion for Years, in his copying *Mayer's lunar Tables*, and thereby rendered those Tables of no Use he has published; which are however perfectly given in our *Royal Astronomer and Navigator*; for Comparison, in their Results, with our own *lunar Tables*. — He has given a Motion for January and December, where should be no Motion; making his Computation immethodical: As April 18^d 10^h 22^m 12^s to stand for May 18^d 10^h 22^m 12^s in his Example, P. 170, *Conn. des Temps*. — He has given us small Equations of the Moon's Parallax, for Paris, to a horizontal Parallax of 57'; correcting the Parallax from the Earth considered as a Sphere to that when it is considered as a Spheroid; according to the Moon's Distance, in Time, from the Meridian and her N. or S. Declination. — A Table of Acceleration for Rising, and Retardation for Setting, of Stars, caused by Refraction; according to the Pole's Height. — Table of the Change of the Sun's Declination, for several Hours before the Summer Solstice. — Table of the Difference between the Sun's greatest and present Declination, for a few Degrees of his Longitude before and after the 2 Solstices — How to find the Longitude from a first Meridian, by a Star's Distance from the Moon's Edge, or Distance of the Sun's Edge therefrom, observed under a distant Meridian, and compared with their computed Distances, (in Ephemerids, for every 4 Hours) so as to determine the Time of their same Distance, at the first Meridian. Performed by Charts, allowing for Parallax and Refraction, in the different Situations, and Distances observed; without the Trouble of a tedious trigonometrical Operation, as in M. De la Caille's Method — A Table of Refraction. — Epochas of the fixed Stars for Centuries, from 0 to 1800, unequally increasing, from 10 23' 2", 8 (the Precession of the Equinoxes, from 0 to 100) to 10 23' 53", 6, the greatest Increase in those Centuries; being the Precession from 1700 to 1800.

N. B. Some of our Hair-splitting Astronomers (as they may be denominated) are similar to the Hair-splitting Navigators.

SUPERNUMERARY QUESTIONS.

XXVIII. NEW QUESTION 230, by Mr. Brown, of Portsmouth.

IF the Abscissa = 50, Semi ordinate = 70, and the Equation of the Curve be $ax^3 = y^2$, supposed to revolve round its Axis: Required the Dimensions and Solidity of the greatest Solid that can be cut out of the former, the Equation of whose Curve is $px^4 = y^3$.

XXIX. QUESTION* 231, by Mr. John Chester, of Deptford Yard.

A Gentleman offers a Farmer any No. of 120 Acres of Land at 20s. per Acre, yearly Rent, for a Lease of 21 Years. But if the Farmer chuses to pay down 100l. for 24 Acres, he is then to pay only 14l. instead of 24l. yearly Rent, for 21 Years. Or paying down 200l. for 48 Acres, then he is to pay 28 instead of 48l. yearly Rent for 21 Years; and so in that Proportion. And if the Farmer pays his Rent half yearly, for 21 Years, allowing him 5 per Cent. per An. for his Money paid down: Required the No. of Acres he must hire of the Landlord to be the greatest Gainer possible by his Bargain? and what will be his Gains?

* In Gent. Diary 1738; but never solved; but proposed for Mr. Brown to solve.

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ROYAL EPHEMERIS, or STATE of the HEAVENS, for the *Royal Observatory*
at *Greenwich*, 1762.

Astronom. New, Full, and QUARTER MOONS, or LUNATIONS for 1762. N.S.

January. Moons.			February. Moons.			March. Moons.					
3	0 ^h 35 ^m A. First Q.	2	4 ^h 6 ^m M. First Q.	3	2 ^h 58 ^m A. First Q.	10	6 11 M. Full	17	0 30 A. Last Q.	25	3 34 A. New
10	9 57 M. Full	8	8 3 A. Full	10	6 11 M. Full	17	0 30 A. Last Q.	25	3 34 A. New		
17	3 9 M. Last Q.	15	6 50 A. Last Q.	17	0 30 A. Last Q.	25	3 34 A. New				
25	4 11 M. New	23	10 39 A. New								
April.			May.			June.					
1	11 22 A. First Q.	1	7 9 M. First Q.	6	4 19 A. Full	14	5 56 A. Last Q.	23	1 18 M. New	28	4 3 A. First Q.
8	4 42 A. Full	8	4 0 M. Full	14	5 56 A. Last Q.	23	1 18 M. New	28	4 3 A. First Q.		
16	7 9 M. Last Q.	16	1 17 M. Last Q.	23	4 42 A. New						
24	5 33 M. New	23	4 42 A. New	30	10 23 M. First Q.						
		30	10 23 M. First Q.								
July.			August.			September.					
6	6 0 M. Full	4	8 11 A. Full	3	0 5 A. Full	11	8 33 M. Last Q.	17	11 33 A. New	25	0 45 M. First Q.
14	8 55 M. Last Q.	12	9 43 A. Last Q.	11	8 33 M. Last Q.	17	11 33 A. New	25	0 45 M. First Q.		
21	8 33 M. New	19	2 33 A. New	17	11 33 A. New	25	0 45 M. First Q.				
28	0 40 M. First Q.	26	10 24 M. First Q.								
October.			November.			December.					
3	4 30 M. Full	1	8 53 A. Full	1	11 46 M. Full	8	8 53 M. Last Q.	15	11 35 M. New	23	9 12 A. First Q.
10	5 31 A. Last Q.	9	1 18 M. Last Q.	8	8 53 M. Last Q.	15	11 35 M. New	23	9 12 A. First Q.	31	0 43 M. Full.
17	9 14 M. New	15	9 18 A. New	15	11 35 M. New	23	9 12 A. First Q.	31	0 43 M. Full.		
24	6 34 A. First Q.	23	2 44 A. First Q.								

Note, A. stands for Afternoon, and M. for Morning.

IV. ECLIPSES. II. of the SUN, and II. of the MOON.

I. Sun eclipsed, April 24, at half an Hour past 5 in the Morning, vertical to the Indian Ocean, visible only to the Southern Parts of the Globe.

T. Harris.

II. Moon visibly eclipsed, May 8, Morning.

	Beginning.	Middle.	End.	Dig. S.
	h m s	h m s	h m s	
Mr. Thomas Harris, for London	2 27 37	4 0 15	5 32 33	9 54
By Leadbetter's Tables	2 8 27	3 41 24	5 14 21	9 51
De la Caille	2 21 29	3 53 49	5 26 9	9 42
Mr. Alex. Rowe, by Leadbetter's Tables	2 13 55	3 47 5	5 20 15	10 10
Palladium Tables, 1st Equations	2 7 25	3 40 35	5 13 45	Ditto
			Duration 3 ^h 6 ^m 20 ^s	
Mr. Alex. Rowe, Pall. Tab. for Penzance	1 45 25	3 18 35	4 51 45	Ditto
Leadbetter's Tables	1 51 55	3 25 5	4 58 15	
Mr. William Chapman, for Leister	2 25 49	3 56 27	5 29 5	9 50

III. Sun visibly eclipsed, October 17, Morning.

	N.
Mr. T. Harris, for London, Pall. Tables	6 57 10 7 48 50 8 47 2 5 54
De la Caille	6 59 0 7 50 0 8 48 0 5 20
Mr. William Chapman, for Leister	6 55 0 7 46 0 8 44 0 6 12
	Mr.

Mr. Chapman says, this Eclipse, with Respect to London Meridian, begins on the Sun's vertical Point, at his Rising, in Lat. $56^{\circ} 20'$ N. and Long. $10^{\circ} 6'$ W. in the German Ocean, a little to the East of St. Andrew's in Scotland, the Centre of the Penumbra falls on this Globe. And the Sun is seen first centrally eclipsed at his Rising, in Lat. $75^{\circ} 13'$ and Long. $4^{\circ} 21'$ E. in the Eastern Coast of West Greenland. From whence it bends its Course South-East over the Northern Ocean by the Isle Suruy, and enters Lapland in Lat. $70^{\circ} 55'$ N. Long. $20^{\circ} 18'$ E. to the West of N. Cape. And passing over the Middle of Turneo, Lampark, and to the East of Turneo, it enters Finland, and passing a small Matter to the East of Petersburgh, over the Lake Ladago, it enters Muscovy, and so passes into the Muscovite Tartary; where, in Lat. $57^{\circ} 53'$ N. and Long. $50^{\circ} 32'$ E. betwixt Casan and Astracan to the East of Wolga, the meridional Sun will be centrally eclipsed on the Meridian. The Sun will be eclipsed Northward as far as $80^{\circ} 41'$ N. Lat. where the Sun will be in the Meridian and Horizon at once: And the Defect about 9 Digits. Southward over Part of the Caspian Sea, Persia, Arabia Felix into the Indian Ocean to Lat. $9^{\circ} 34'$ N. where the Sun's upper Limb will be just touched by the Moon's lower Limb; still keeping on its Course South-easterly till it arrives in Lat. $33^{\circ} 9'$ and Long. $63^{\circ} 39'$. A little to the East of Samarcande the Sun will be centrally eclipsed in the 90th Degree of the Ecliptic. And having passed Ubec, Tartary, and the Kingdom of Thybet, it enters China, where in Lat. $23^{\circ} 33'$ N. and Long. $109^{\circ} 56'$ North West of Canton, the Sun is last seen centrally eclipsed at his Setting. And the whole Penumbra quits the Earth in Lat. $2^{\circ} 52'$ N. and Long. $95^{\circ} 53'$ E. in the Northern Parts of the Island Sumatra.

N. B. The Latitudes and Longitudes of the Places mentioned are taken from Salmon's geographical Grammar.

IV. Moon visibly eclipsed, November 1, at Night.

	Beginning	Middle.	End.	Digits S.
	h m s	h m s	h m s	
Mr. Thomas Harris, for London	7 22 13	8 45 11	10 8 9	6 45
Mr. Alex. Rowet, Pall. Tables	8 10 21	9 31 27	10 52 33	3 33
Leadbetter's	8 4 14	9 25 20	10 46 26	
De la Caille	7 22 21	8 45 0	10 7 29	6 53

The principal Appearances of the Solar Eclipse, on the 17th of October. By Mr. Thomas Harris, of Bugbrook.

	Lat. N.	Long.	☉ Limb.	Place:
Eclipse at Sun-rise	$56^{\circ} 18'$	$10^{\circ} 10' W$	Upper	East of Scotland.
Centrally eclipsed at Sun-rise	$75^{\circ} 10'$	$4^{\circ} 18' E$	Total	West Greenland.
Centrally eclipsed at Noon	$52^{\circ} 2'$	$50^{\circ} 19' E$	Total	E. of River Volga.
Centrally in 90 Deg.	$38^{\circ} 12'$	$63^{\circ} 30' E$	Total	S. of River Oxus.
Centrally eclipsed at Sun-set	$23^{\circ} 39'$	$109^{\circ} 22' E$	Total	Hocith China.
Eclipse ends at Sun-set	$2^{\circ} 50'$	$95^{\circ} 23' E$	Upper	Isle of Sumatra.
Sun's upper Limb touched by the Moon's lower Limb	$9^{\circ} 48'$	$50^{\circ} 19' E$	Upper	Indian Ocean.
Eclipsed in the Horizon at Noon, near 10 Digits	$80^{\circ} 40'$	$50^{\circ} 19'$	Lower	Icy Sea.

The Center of the Penumbra continues within the Earth's Disk for about 2 Hours and 18 Minutes, and passes over the Earth with the Velocity of about 4 English Miles in a Minute; which is above 4 Times as swift as a Cannon Ball.

ROYAL EPHEMERIS for GREENWICH-OBSERVATORY, 1762. [7]

A TABLE for finding the Difference of LONGITUDE from Greenwich, by comparing the Times of the Satellite Eclipses with those observed.

Times of the ECLIPSES of the first SATELLITE of JUPITER, for 1762, N. S. at Greenwich Observatory.

January.				February.				March.				April.				May.				June.																											
Emerſion.				Emerſion.				Emerſion.								Immerſion				Immerſion																											
D.	h	m	s	D.	h	m	s	D.	h	m	s	The 2d, 3d, & 4th Satellite cannot be ſeen from the 12th, 16th, and 25th of March, till 1ſt, 5th, & 6th of May reſpectively, for the ſame Cauſe.												D.	h	m	s	D.	h	m	s																
1	10	51	47	2	7 [*] 23	15		2	15	8	3													1	17	33	14	2	14	8	12																
3	5 [*] 19	56		4	1	52	3	4	9	37	19													3	12	2	8	4	8	36	32																
4	23	48	6	5	20	20	54	6	4	6	36													5	6	31	0	6	3	4	48																
6	18	16	18	7	14	49	47	7	22	35	53													7	0	59	49	7	21	33																	
8	12	44	32	9	9	18	42	9	17	5	11													8	19	28	35	9	16	1	13																
10	7 [*] 12	48		11	3	47	38	11	11	34	30													10	13	57	19	11	10	29	24																
12	1	41	5	12	22	16	36	13	6 [*] 3	50														12	8	26	2	13	4	57	34																
15	20	9	22	14	16	45	35	15	0	33	11													14	2	54	43	14	20	25	45																
15	14	37	45	16	11	14	37	16	19	2	32													15	21	23	22	16	17	53	56																
17	9 [*] 6	9	20	0	12	48		Jupiter is ſo near the Sun, that his 1ſt Sa- telite can- not be ſeen till 1ſt of May fol- lowing.																17	15 [*] 51	59	18	12	22	8																	
19	3	34	35	21	18	41	57																	19	10	20	33	20	6	50	19																
20	22	3	3	23	13	11	7																	21	4	49	4	22	1	18	30																
22	16	31	32	25	7	40	19																	22	23	17	33	23	19	46	41																
24	11	0	3	27	2	2	33																	24	17	46	1	25	14 [*] 14	52																	
26	5 [*] 28	37		28	20	38	48																	26	12	14	29	27	8	43	3																
27	23	57	13																					28	6	42	56	29	3	11	15																
29	18	25	51																					30	1	11	22	30	21	39	27																
31	12	54	31																	31	19	39	48																								
July.				Auguſt.				September.				October.				November.				December.																											
Immerſion				Immerſion				Immerſion				Immerſion				Emerſion.				Emerſion.																											
D.	h	m	s	D.	h	m	s	D.	h	m	s	D.	h	m	s	D.	h	m	s	D.	h	m	s																								
2	16	7	40	1	18	9	29	2	14 [*] 48	26		2	17	3	7	1	21	22	5	1	23	23	36																								
4	10	35	53	3	12 [*] 38	3		4	9 [*] 17	28		4	11 [*] 32	12		3	15 [*] 50	42		3	17	51	38																								
6	5	4	7	5	7	6	39	6	3	46	31	6	6	1	16	5	10	19	17	5	12 [*] 19	39																									
7	23	32	22	7	1	35	18	7	22	15	35	8	0	30	19	7	4	47	49	7	6 [*] 47	39																									
9	18	0	37	8	20	3	59	9	16 [*] 44	39		9	18	59	21	8	23	16	20	9	1	15	38																								
11	12 [*] 28	32		10	14 [*] 32	42		11	11 [*] 13	44		11	13 [*] 28	22		10	17	44	49	10	19	43	36																								
13	6	57	8	12	9	1	28	13	5	42	50	13	7 [*] 57	21		12	12 [*] 13	15		12	14 [*] 11	33																									
15	1	25	24	14	3	30	15	15	0	11	56	15	2	26	19	14	6 [*] 41	38		14	8 [*] 39	30																									
16	19	53	40	15	21	59	5	16	18	47	3	16	20	55	16	16	1	9	59	16	3	7	27																								
18	14 [*] 21	57		17	16 [*] 27	56		18	13 [*] 10	11		18	15 [*] 24	11		17	19	38	18	19	16	3	19																								
20	8	50	16	19	10 [*] 56	48		20	7	39	19	20	9 [*] 53	4		19	14 [*] 6	35		21	10 [*] 31	15																									
22	3	18	37	21	5	25	41	22	2	8	27	22	4	21	55	21	8 [*] 34	50		23	4 [*] 59	11																									
23	21	47	0	22	23	54	35	23	20	37	35	23	22	50	44	23	3	3	3	24	23	27	8																								
25	16 [*] 15	26		24	18	23	30	25	15 [*] 7	22	25	25	17 [*] 19	31		24	21	31	14	26	17	55	5																								
27	10	43	54	26	12 [*] 51	28		27	9 [*] 36	49		27	11 [*] 48	16		26	15 [*] 39	23		28	14 [*] 23	3																									
29	5	12	24	28	7	21	24	29	4	4	56	Emerſion				28	10 [*] 27	29		30	8 [*] 51	2																									
30	23	40	56	30	1	50	23	30	22	34	2					30	2	53	25	30	4 [*] 55	33																									

The *Aſteriſm* (*) is placed againſt the Eclipses of the 1st Satellite of Jupiter, viſible at Greenwich Obſervatory. — In which it is obſervable, that theſe Eclipses, in general, are later by 2 Minutes than thoſe computed by the Tables the Eclipses in No. V. *Matb. Mag.* were computed by, not ſo correct as ours for 1761.

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ROYAL

Mr. Chapman says, this Eclipse, with Respect to London Meridian, begins on the Sun's vertical Point, at his Rising, in Lat. $56^{\circ} 20'$ N. and Long. $1^{\circ} 6'$ W. in the German Ocean, a little to the East of St. Andrew's in Scotland, the Center of the Penumbra falls on this Globe. And the Sun is seen first centrally eclipsed at his Rising, in Lat. $75^{\circ} 13'$ and Long. $4^{\circ} 21'$ E. in the Eastern Coast of West Greenland. From whence it bends its Course South-East over the Northern Ocean, by the Isle Suruy, and enters Lapland in Lat. $70^{\circ} 55'$ N. Long. $20^{\circ} 18'$ E. to the West of N. Cape. And passing over the Middle of Turneo, Lampark, and to the East of Turneo, it enters Finland, and passing a small Matter to the East of Petersburgh, over the Lake Ladago, it enters Muscovy, and so passes into the Muscovite Tartary; where, in Lat. $57^{\circ} 53'$ N. and Long. $50^{\circ} 32'$ E. betwixt Casan and Astracan to the East of Wolga, the meridional Sun will be centrally eclipsed on the Meridian. The Sun will be eclipsed Northward as far as $80^{\circ} 41'$ N. Lat. where the Sun will be in the Meridian and Horizon at once: And the Defect about 9 Digits. Southward over Part of the Caspian Sea, Persia, Arabia Felix, into the Indian Ocean to Lat. $9^{\circ} 34'$ N. where the Sun's upper Limb will be just touched by the Moon's lower Limb; still keeping on its Course South-easterly till it arrives in Lat. $33^{\circ} 9'$ and Long. $63^{\circ} 39'$. A little to the East of Samarcande the Sun will be centrally eclipsed in the 90th Degree of the Ecliptic. And having passed Ubec, Tartary, and the Kingdom of Thibet, it enters China, where, in Lat. $23^{\circ} 33'$ N. and Long. $109^{\circ} 56'$ North West of Canton, the Sun is last seen centrally eclipsed at his Setting. And the whole Penumbra quits the Earth in Lat. $2^{\circ} 52'$ N. and Long. $95^{\circ} 53'$ E. in the Northern Parts of the Island Sumatra.

N. B. The Latitudes and Longitudes of the Places mentioned are taken from Salmon's geographical Grammar.

IV. Moon visibly eclipsed, November 1, at Night.

	Beginning	Middle.	End.	Digits S.
	h m s	h m s	h m s	
Mr. Thomas Harris, for London	7 22 13	8 45 11	10 8 9	6 45
Mr. Alex. Rowet, Pall. Tables	8 10 21	9 31 27	10 52 33	5 33
----- Leadbetter's	8 4 14	9 25 20	10 46 26	
De la Caille	7 22 21	8 45 0	10 7 29	6 53

The principal Appearances of the Solar Eclipse, on the 17th of October. By Mr. Thomas Harris, of Bugbrook.

	Lat. N.	Long.	☉ Limb.	Place:
Eclipse at Sun-rise	$56^{\circ} 18'$	$1^{\circ} 10' W$	Upper.	East of Scotland.
Centrally eclipsed at Sun-rise	$75^{\circ} 10'$	$4^{\circ} 18' E$	Total.	West Greenland.
Centrally eclipsed at Noon	$52^{\circ} 2'$	$50^{\circ} 19' E$	Total.	E. of River Volga.
Centrally in 90 Deg.	$38^{\circ} 12'$	$63^{\circ} 30' E$	Total.	S. of River Oxus.
Centrally eclipsed at Sun-set	$23^{\circ} 39'$	$109^{\circ} 2' E$	Total.	Hocith China.
Eclipse ends at Sun-set	$2^{\circ} 50'$	$95^{\circ} 23' E$	Upper.	Isle of Sumatra.
Sun's upper Limb touched by the Moon's lower Limb	$9^{\circ} 48'$	$50^{\circ} 19' E$	Upper.	Indian Ocean.
Eclipsed in the Horizon at Noon, near 10 Digits	$80^{\circ} 40'$	$50^{\circ} 19'$	Lower.	Icy Sea.

The Center of the Penumbra continues within the Earth's Disk for about 2 Hours and 18 Minutes, and passes over the Earth with the Velocity of about 4 English Miles in a Minute; which is above 4 Times as swift as a Cannon Ball.

A TABLE for finding the Difference of LONGITUDE from Greenwich, by comparing the Times of the Satellite Eclipses with those observed.

Times of the ECLIPSES of the first SATELLITE of JUPITER, for 1762, N. S. at Greenwich Observatory.

January.				February.				March.				April.				May.				June.															
Emerſion.				Emerſion.				Emerſion.								Immerſion				Immerſion															
D.	h	m	s	D.	h	m	s	D.	h	m	s	D.	h	m	s	D.	h	m	s	D.	h	m	s												
1	10	51	47	2	7 [*] 23	15		2	15	8	3	The 2d, 3d, & 4th Satellite cannot be ſeen from the 12th, 16th, and 25th of March, till 1ſt, 5th, & 6th of May reſpectively, for the ſame Cauſe.				1	17	33	14	2	14	8	12												
3	5 [*] 19	56		4	1	52	3	4	9	37	19					3	12	2	8	4	8	36	32												
4	23	48	6	5	20	20	54	6	4	6	36					5	6	31	0	6	3	4	48												
6	18	16	18	7	14	49	47	7	22	35	53					7	0	59	49	7	21	33	1												
8	12	44	32	9	9	18	42	9	17	5	11					8	19	28	35	9	16	1	13												
10	7 [*] 12	48		11	3	47	38	11	11	34	30					10	13	57	19	11	10	29	24												
12	1	41	5	12	22	16	36	13	6 [*] 3	50						12	8	26	2	13	4	57	34												
15	20	9	22	14	16	45	35	15	0	33	11					14	2	54	43	14	20	25	45												
15	14	37	45	16	11	14	37	16	19	2	32					15	21	23	22	16	17	53	56												
17	9 [*] 6	9		20	0	12	48	Jupiter is ſo near the Sun, that his 1ſt Satellite cannot be ſeen till 1ſt of May following.								17	15 [*] 51	59	18	12	22	8													
19	3	34	35	21	18	41	57									19	10	20	33	20	6	50	19												
20	22	3	3	23	13	11	7									21	4	49	4	22	1	18	30												
22	16	31	32	25	7	40	19									22	23	17	33	23	19	46	41												
24	11	0	3	27	2	2	33									24	17	46	1	25	14 [*] 14	52													
26	5 [*] 28	37		28	20	38	48									26	12	14	29	27	8	43	3												
27	23	57	13													28	6	42	56	29	3	11	15												
29	18	25	51													30	1	11	22	30	21	39	27												
31	12	54	31													31	19	39	48																
July.				August.				September.				October.				November.				December.															
Immerſion				Immerſion				Immerſion				Immerſion				Emerſion.				Emerſion.															
D.	h	m	s	D.	h	m	s	D.	h	m	s	D.	h	m	s	D.	h	m	s	D.	h	m	s												
2	16	7	40	1	18	9	29	2	14 [*] 48	26		2	17	3	7	1	21	22	5	1	23	23	36												
4	10	35	53	3	12 [*] 38	3		4	9 [*] 17	28	4	4	11 [*] 32	12		3	15 [*] 50	42	3	17	51	38													
6	5	4	7	5	7	6	39	6	3	46	31	6	6	1	16	5	10	19	17	5	12 [*] 19	39													
7	23	32	22	7	1	35	18	7	22	15	35	8	0	30	19	7	4	47	49	7	6 [*] 47	39													
9	18	0	37	8	20	3	59	9	16 [*] 44	39		9	18	59	21	8	23	16	20	9	1	15	38												
11	12 [*] 28	32		10	14 [*] 32	42		11	11 [*] 13	44		11	13 [*] 28	22		10	17	44	49	10	19	43	36												
13	6	57	8	12	9	1	28	13	5	42	50	13	7	57	21	12	12 [*] 13	15	12	14 [*] 11	33														
15	1	25	24	14	3	30	15	15	0	11	56	15	2	26	19	14	6 [*] 41	38	14	8 [*] 39	30														
16	19	53	40	15	21	59	5	16	18	41	3	16	20	55	16	16	1	9	59	16	3	7	27												
18	14 [*] 21	57		17	16 [*] 27	56		18	13 [*] 10	11		18	15 [*] 24	11		17	19	38	18	19	16	3	19												
20	8	50	16	19	10 [*] 56	48		20	7	39	19	20	9	53	4	19	14 [*] 6	35	21	10 [*] 31	15														
22	3	18	37	21	5	25	41	22	2	8	27	22	4	21	55	21	8 [*] 34	50	23	4 [*] 59	11														
23	21	47	0	22	23	54	35	23	20	37	35	23	22	50	44	23	3	3	3	24	23	27	8												
25	16 [*] 15	26		24	18	23	30	25	15 [*] 7	22		25	17 [*] 19	31		24	21	31	14	26	17	55	5												
27	10	43	54	26	12 [*] 51	28		27	9 [*] 36	49		27	11 [*] 48	16		26	15 [*] 59	23	28	14 [*] 23	3														
29	5	12	24	28	7	21	24	29	4	4	56	Emerſion				28	10 [*] 27	29	30	8 [*] 51	2														
30	23	40	56	30	1	50	23	30	22	34	2					30	2	53	25	30	4	55	33												

The Asterisk (*) is placed againſt the Eclipses of the 1st Satellite of Jupiter, viſible at Greenwich Obſervatory. — In which it is obſervable, that theſe Eclipses, in general, are later by 2 Minutes than thoſe computed by the Tables the Eclipses in No. V. *Math. Mag.* were computed by, not ſo correct as ours for 1761.

We had not Room for the Planets Southing and Declination for 1762. — We are therefore obliged to omit Part of our Ephemeris for other Matter.

ROYAL EPHEMERIS FOR GREENWICH OBSERVATORY, 1762.

January.			February			March			April			May			June		
D		Decl.	D		Decl.	D		Decl.	D		Decl.	D		Decl.	D		Decl.
South		Noon.	South		at N.	South		Noon.	South		Noon.	South		Noon.	South		Noon.
h	m	o	h	m	o	h	m	o	h	m	o	h	m	o	h	m	o
1	4 43	8S48	5 21	11n48		4 8	16n21		5 58	27n33		6 53	21n29		8 10	0S19	
2	5 23	3 22	6 11	17 22		5 0	20 54		7 1	26 49		7 47	16 36		8 54	6 36	
3	6 6	2n16	7 4	21 47		5 56	24 32		8 1	24 19		8 37	10 49		9 43	12 32	
4	6 49	8 5	8 2	25 8		6 54	26 48		8 56	20 18		9 26	4 31		10 32	17 43	
5	7 37	13 40	9 5	26 55		7 58	27 20		9 47	14 53		10 14	18 51		11 22	22 4	
6	8 29	18 47	10 10	26 56		8 58	26 7		10 37	8 57		11 2	8 16		12 14	25 14	
7	9 25	23 0	11 15	24 55		9 58	23 3		11 27	2 44		11 51	14 7		13 7	27 5	
8	10 29	25 54	12 13	21 7		10 56	18 27		12 16	4S11		12 41	19 11		14 0	27 34	
9	11 34	27 5	13 9	16 7		11 51	12 40		13 4	10 23		13 34	23 13		14 50	26 41	
10	12 38	26 12	14 0	9 53		12 43	6 13		13 58	16 6		14 27	26 0		15 38	24 33	
11	13 40	23 25	14 50	3 21		13 33	0S19		14 48	20 48		15 20	27 21		16 25	21 21	
12	14 38	19 0	15 39	3S 5		14 22	6 52		15 40	24 22		16 12	27 30		17 9	17 20	
13	15 31	13 27	16 26	9 14		15 10	12 50		16 33	26 40		17 1	26 12		17 49	12 37	
14	16 20	7 21	17 16	14 44		16 0	18 2		17 26	27 35		17 49	23 44		18 31	7 23	
15	17 7	1 3	18 5	19 25		16 52	22 13		18 17	27 10		18 33	20 17		19 13	1 53	
16	17 52	5S 5	18 55	23 9		17 44	25 14		19 6	25 28		19 16	16 0		19 57	3N42	
17	18 39	10 50	19 45	25 43		18 37	27 1		19 52	22 41		19 58	11 2		20 45	9 35	
18	19 24	15 59	20 35	27 3		19 28	27 27		20 35	18 57		20 40	5 42		21 36	15 4	
19	20 12	20 21	21 26	27 8		20 17	25 35		21 19	14 24		21 24	0N 1		22 34	20 20	
20	21 1	23 43	22 14	25 55		21 4	24 35		22 1	9 17		22 10	5 52		23 34	24 2	
21	21 53	26 0	23 2	23 30		21 43	21 27		22 42	3 43		22 57	11 38		0	26 39	
22	22 43	7 3	23 47	20 16		22 33	16 27		23 26	2N 4		23 50	17 1		0 37	27 34	
23	23 33	26 49	0	16 2		23 15	13 3		0	8 0		0	21 42		1 40	26 29	
24	0	25 21	0 30	11 11		23 58	7 24		0 13	13 4		0 47	25 15		2 37	23 33	
25	0 20	22 46	1 12	5 53		0	1 47		1 4	18 40		1 47	27 16		3 33	19 5	
26	1 7	19 14	1 53	0 14		0 41	4N 1		2 0	23 3		2 51	27 28		4 25	13 31	
27	1 45	14 55	2 35	5N 30		1 25	9 47		3 1	26 6		3 53	25 36		5 15	7 19	
28	2 32	9 57	3 20	11 5		2 10	15 13		4 2	27 32		4 52	22 28		6 3	0 57	
29	3 12	4 36	4 Sem. Diam.			3 1	20 2		5 1	27 12		5 46	17 45		6 50	5S 23	
30	3 54	1N 0	to Hor. Par. a			3 57	23 55		5 58	25 8		6 35	12 13		7 38	11 21	
31	4 44	6 40	15' to 55' 30"			4 57	26 33					7 23	6 1				
D		In	D		In	D		In	D		In	D		In	D		In
in Deg.		T.	in Deg.		T.	in Deg.		T.	in Deg.		T.	in Deg.		T.	in Deg.		Time
'	"	s	'	"	s	'	"	s	'	"	s	'	"	s	'	"	s
1	14 56	69	1	15 27	65	1	15 30	67	1	15 59	75	1	16 7	72	1	15 51	65
3	15 17	63	3	15 53	71	3	15 49	72	3	16 11	74	3	16 6	68	3	15 40	66
5	15 44	67	5	16 24	77	5	16 13	76	5	16 19	70	5	15 59	66	5	15 25	69
7	16 17	74	7	16 43	76	7	16 31	75	7	16 16	67	7	15 47	67	7	15 7	71
9	16 41	78	9	16 41	72	9	16 33	70	9	15 39	67	9	15 26	70	9	14 54	69
11	16 44	70	11	16 18	68	11	16 18	67	11	15 34	69	11	15 7	71	11	14 47	66
13	16 25	69	13	15 46	66	13	15 49	66	13	15 10	71	13	14 53	69	13	14 49	63
15	15 57	65	15	15 16	67	15	15 21	69	15	14 52	69	15	14 47	65	15	15 0	62
17	15 27	65	17	14 52	69	17	14 57	70	17	14 47	66	17	14 53	65	17	13 25	65
19	15 6	66	19	14 47	69	19	14 47	60	19	14 55	65	19	15 14	63	19	16 2	72
21	14 5	73				21	15 31	67	21	15 59	74	21	16 11	73	21	16 8	67
23	15 7	62				23	15 45	72	23	16 4	75	23	16 2	68	23	15 47	65

ROYAL EPHEMERIS for GREENWICH OBSERVATORY, 1762.

July.				August.				September.				October.				November.				December.				
D.	South		Decl.	D.	South		Decl.	D.	South		Decl.	D.	South		Decl.	D.	South		Decl.	D.	South		Decl.	
	h	m	o		h	m	o		h	m	o		h	m	o		h	m	o		h	m	o	h
1	8	25	16S40	9	44	27S36	11	8	20S29	11	14	7S27	12	8	13N18	12	29	25N2	2	9	14	21	10	
2	9	14	21	10	38	27	21	11	45	16	12	11	56	1	53	18	25	13	29	27	21	11	45	
3	10	4	24	33	11	25	25	46	12	26	11	17	12	38	3N51	13	50	22	43	14	32	28	1	
4	10	56	26	44	12	13	23	5	13	7	5	57	13	20	9	30	14	46	25	57	15	31	26	48
5	11	48	27	35	12	57	19	25	13	47	0	23	14	7	14	52	15	45	27	46	16	27	23	54
6	12	40	27	1	13	40	15	0	14	29	5N13	14	57	19	41	16	43	27	55	17	18	19	34	2
7	13	30	25	11	14	21	10	0	15	13	10	49	15	51	23	41	17	43	26	20	18	8	14	17
8	14	16	22	16	15	2	4	39	16	0	16	3	16	49	26	32	18	38	23	9	18	55	7	55
9	15	0	18	23	15	42	0N50	16	49	20	38	17	49	27	57	19	30	18	32	19	43	1	26	4
10	15	41	13	53	16	24	6	31	17	45	24	21	18	47	27	42	20	20	12	53	20	31	5S	8
11	16	22	8	48	17	9	11	58	18	43	26	54	19	45	25	42	21	7	6	33	21	21	11	23
12	17	8	3	25	17	58	17	14	19	44	27	55	20	37	22	5	21	50	0S	7	22	12	17	4
13	17	44	2N12	18	51	21	32	20	45	27	13	21	29	17	2	22	45	6	47	23	6	21	51	5
14	18	29	7	49	19	49	25	2	21	45	24	36	22	25	11	27	23	37	13	7	25	19	25	19
15	19	16	13	17	20	52	27	12	22	41	20	22	23	14	4	19	0	18	40	0	1	27	25	2
16	20	6	18	22	21	53	27	41	23	35	14	47	0	2S37	0	31	23	8	0	55	27	58	27	58
17	21	2	22	42	22	55	26	15	0	8	13	0	6	9	24	1	27	26	13	1	50	27	1	1
18	22	3	25	50	23	53	22	55	0	50	2	21	0	57	15	25	2	23	27	49	2	41	24	46
19	23	7	27	20	0	17	58	1	21	5S43	1	50	1	50	20	39	3	18	27	51	3	28	21	22
20	0	27	12	0	49	11	53	2	11	12	6	2	45	24	37	4	10	26	39	4	12	17	12	3
21	0	11	24	57	1	42	5	10	3	3	17	46	3	41	27	3	5	0	23	49	4	54	13	20
22	1	13	20	53	2	35	1S42	3	57	22	21	4	37	28	3	5	46	20	13	5	33	7	7	7
23	2	11	15	29	3	27	8	18	4	52	25	38	5	31	27	33	6	30	15	48	6	13	1	47
24	3	5	9	12	4	16	14	19	5	46	27	32	6	23	25	46	7	9	10	48	6	53	3N1	1
25	3	54	2	36	5	6	19	25	6	41	28	1	7	11	22	46	7	49	5	28	7	34	9	37
26	4	42	3S56	5	57	24	25	7	32	27	4	7	56	18	54	8	29	0N8	8	18	14	57	14	57
27	5	30	9	41	6	49	26	12	8	21	24	51	8	38	14	18	9	9	5	51	9	8	19	48
28	6	17	15	40	7	42	27	57	9	7	21	47	9	19	9	9	9	52	11	55	10	2	23	51
29	7	7	20	22	8	34	27	41	9	51	17	55	9	59	3	37	10	39	16	44	11	0	26	59
30	7	58	23	47	9	25	26	24	10	33	12	48	10	40	2N2	11	32	21	22	12	2	27	56	0
31	8	51	26	29	10	7	23	57					11	22	7	48					13	3	27	24
D.	Decl.	in	D.	Decl.	in	D.	Decl.	in	D.	Decl.	in	D.	Decl.	in	D.	Decl.	in	D.	Decl.	in	D.	Decl.	In	
	in Deg	T.		in Deg	T.		in Deg	T.		in Deg	T.		in Deg	T.		in Deg	T.		in Deg	T.		in Deg	Time.	
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
1	15	2	67	1	14	59	70	1	14	47	65	1	14	55	62	1	15	17	65	1	15	48	73	
3	15	14	70	3	14	51	68	3	14	48	62	3	15	1	62	3	15	34	70	3	16	2	76	
5	15	1	71	5	14	48	65	5	14	55	61	5	15	12	65	5	11	44	74	5	16	8	73	
7	14	50	68	7	14	48	62	7	15	5	64	7	15	27	71	7	15	56	74	7	16	7	69	
9	14	46	64	9	14	55	62	9	15	21	68	9	15	44	74	9	16	6	67	9	16	2	66	
11	14	47	62	11	15	8	63	11	15	44	75	11	16	1	74	11	16	11	67	11	15	6	67	
13	14	59	62	13	15	34	70	13	16	11	76	13	16	21	71	13	15	15	72	13	14	51	64	
15	15	22	65	15	16	5	75	15	15	57	70	15	15	72	21	14	55	67	22	14	47	61		
17	15	54	72	17	15	53	68	17	15	26	71	17	14	54	69	17	14	48	63	17	14	57	62	
19	16	2	67	19	15	24	70	19	15	2	71	19	14	45	68	19	14	51	61	19	15	18	66	
21	15	31	67	21	15	2	71	21	14	50	68	21	14	48	61	21	15	5	63	21	15	43	72	
23	15	13	69	23	14	51	68	23	14	46	65	23	15	0	62	23	15	25	67	23	16	7	76	

Printed and sold by Mr. Bird, Ave-Mary Lane.

PROPORTIONAL DIMENSIONS of the Solar SYSTEM.

SIR *Isaac Newton* having proved that the Squares of the Times of the Planets Revolutions are as the Cubes of their mean Distances from the Sun, the proportional Distances of the Planets from their periodic Times to the same fixed Stars, will be as follow.

Periodic T ^s .	Propor.	Hence, if the Sun's Parallax, or Angle the
Days.	Dist.	Earth's Semi-diameter is 'seen under from the Sun,
$\frac{1}{2}$ 10759,275	954006	be $10''\frac{1}{2}$ (till the Observation of <i>Venus's</i> Transit, taken abroad, more accurately determine,) Say, As
$\frac{2}{4}$ 4332,514	520096	S. $10''\frac{1}{2}$ Hor. Par. : 1 :: Radius : 19666,58 Semi-
$\frac{3}{8}$ 686,9785	152369	diam, of the Earth for the Sun's Distance, which
$\odot$ 365,2565	100000	multiplied by 4000 Miles (nearly) in 1 Semi-diam,
$\oplus$ 224,6176	72333	produces 78666320 Miles.
$\otimes$ 87,9692	38720	

See P. 211, *Newton's Prin.*

ii. Vol. *Motte's Trans.* 1729.

See also *Royal Ast. P.* 127.

Thus we oblige the sagacious Miss *Willeter* of *Epsom*, and answer her Objections, whom we shall farther oblige, as Time and Opportunity permit.

REMARKS and CORRECTIONS.

Chesterfieldensis has sent us several Corrections of Questions and Solutions we have not Room for, (being obliged to leave out 7 Pages of the less material Copy) or we should have gladly inserted them, but must defer it.—This Correspondent has sometimes considered the Questions in a different Sense from the Proposer's Meaning (through the Defect of Language) in which Sense he has proved his Solutions, sent us at different Times, to be accurately true, according to the Principles he went upon.

Sol. to Qu. 19. P. 48. Pal. 1761, (objected to at P. 657, *Imp. Mag.* for Dec. 1760) we find to be accurately true; because x , the Water's Height, is a Maximum, and therefore has no Fluxion. (See *Ex. 2. of Max. and Min.* *Emerson's* Fluxions, for a like Instance.)—We find but few understood the Solution to this *Quest.* who therefore made wrong Objections. For, by inscribing a SPHEROID longer and longer in the conical Glass, (the Relation of whose Heights to its Diameters is every where given) the Spheroid becomes infinite, and degenerates into a double PARABOLOID; which is Nothing but an infinite, or indefinite, Spheroid, divided in the Middle by its conjugate Axis. And thus the lower and upper Parts of a Comet's vastly extensive elliptic Orbit, are very near PARABOLAS.—Were the Spheroid's Length farther extended, it would degenerate into a double HYPERBOLOID, and would fill the Glass more than the double PARABOLOID, by becoming infinite. But the *Quest.* being confined to SPHEROIDS, extends only to PARABOLOIDS.—A Solution of the like Nature is falsified at P. 658, *Imp. Mag.* 1760, requiring the Diameter of a Globe, the greatest that can be immersed in a parabolic Conoid, of 25 Height, to 10 Diameters.—The correct Ans. denied = 8,009995 Inches Diam. Parameter = 1 = Height of Globe's Segment above the risen Water; a Property proved.—The same *Imp. Critic* has (in another Place *Imp. Mag.*) as absurdly disputed the Solution of the Sun's equal Altitudes, at P. 44, *Pal. 1761*, according to Mr. *Jones's* Method in *Gard. Fol. Log.* and whether 10 denoting Shillings, Thousand Pounds, &c. has the same cube Root, in Answer to *Paradox I. P. 51. Pal. 1761*, using Buffoonery and Quakerism instead of Reason, Argument, and Truth!—Transforming hyperbolic to parabolic Slices,—giving a false and impossible Answer to a right-angled Triangle of greatest, for least, Perimeter, and given Area, in the Name of *Hitchins*. Where the Legs are evidently equal, and conf. the Perim. = $2 + \sqrt{8} \times \sqrt{a}$ (a being the

To *Pall.* { Tremendous Broils! — 'twixt *Ferguson* and *Fisher*!

Author. { The First bow true! — the Last bow *Truth's* Well-wisher.

See Nos 606, 610, 634, 643, and 650, *British Chron.* for Beg. and End of this disputing Campaign. — *Mercator.* Area.)

Area.) In their Expression, $\sqrt{xx-4a} : + x$ a Min. (where x = Sum of Sides and a = Area) $x = 2\sqrt{2a}$ (giving the Perim. as before) and not $= 2\sqrt{a}$, as they made it for an Hypoth. of no Value, under a given Area, of greatest instead of least Perim. making their Correspondents Vouch for the Truth of their absurd Observations; in making the same. Had the Perim. been the greatest, the Hyp. had been infinite. — See every *Imp. Mag.* (now near its Exit) for a Specimen of the like Truth and Judgement in Science. — Enquire of Mr. *H-rt*, Printer, Mr. *D-is*, Cutter, Mr. *Piety*, &c. (who are the Physicians attending its Illness) how long this *Imp. Mag.* has to live.

On Mr. *Brown's* Equat. and Sol. to Quest. 140. P. 64, *Pal.* 1759, we observe, Dist. run = 2729,7455075 Geog. Miles, which at $69\frac{1}{2}$ to a Deg. = 2356,62 Min. of a Deg. — Whence, fr. the Course $61^{\circ} 15' 51''$ (from those Eq^s) the *Diff. of Lat.* comes out (by Rad. to Cos. Course, so is Dist. run to *Diff. Lat.*) $910,793$ Min. = $15^{\circ} 11'$. Whence Lat. sailed to = $34^{\circ} 44'$ and *Diff. Long.* (by Merid. *Diff. Lat.* or *Diff. Log. Tang.* $\frac{1}{2}$ Comp. Lat.) comes out exactly $49^{\circ} 24'$, differing from $56^{\circ} 16'$ W. Long. given (or $303^{\circ} 41'$ E.) by $6^{\circ} 52'$ too little — Mr. *Brown's* Error, from his Course, had from his intricate Equations. See Mr. *Rowe's* Method of Solution, (P. 45. *Pal.* 1761) answering Mr. *Jones's* like Quest. at P. 11. *Gard. fol. Log^s*. Or see the Rules at Case 6. P. 305, *R. Astr.* for finding a consistent Ans. to 140 Quest. in *Pal.* — Mr. B. will have Equat. P. 45, *Pal.* 1761, to be true, though giving a diff. Answer to Mr. *Jones's* accurate Sol. to the same Numbers, in *Gard. fol. Log^s*. — Mr. B. now admits his wrong Numbers, though he said (same Page *Pal.*) if Latitudes be found by plain and Mercator Sailing they will come out much greater than above, though not so true, where he condemns the Principles of plain Sailing and Mercator, though demonstratively true. — He objects to Sol.

to $l.x$ = Min. where $l.x$ is considered the Hyp. Log. of x = 3677894, whose nat. N^o. = 1,14446681, and can have no other Answer. He would distinguish between $l.$ the Hyp. Log. x and $l.$ Hyp. Log. [but of what] by which last he says the Ans. must be given [but how?] contrary to vulgar Notation and his assumed Title of *Arithmeticae speciosè peritus*. Mr. *Rowe* mistakes at P. 63. *Pal.* 1760, where he says the Seg. Solidity of the Cone = db^2x , nearly in the present Case, conf. his Conclu. do not agree. Mr. *Brown's* Sol. to that Q. being accurate.

M. *Brent's* mean elliptic Eq. in his *Compend. Astr.* is according to *Ward's* erroneous Hypothesis, which Eq. is corrected at P. 80 *R. Astr.* — where Mr. B.'s greatest Errors are seen to be $2' 41''$ too little and $2' 33''$ too much in *diff. Parts* of *J's* Orb. — His *Irish* Tub and Butter Qu. (in *Math. Mag.*) was proposed with a Beam without Weight, and answered as inconsistently. We refer to Adepts in Ambiguity, and Connoisseurs in double and treble Entendres, to unfold his other Qu^s.

☞ We would not make any wrong, nor be in the wrong for any, offering Thanks for our own Errors. — Some sue for Debts but will pay none!

To the Palladium Author. Sir, I beg you will insert the following, communicated by your most humble Servant, Mercator. Portsmouth Coffee-house, Nov. 5, 1761. A Dialogue between a blind Beggar and a Louse: Occasioned by a Bookseller translating an Author.

B. A Beggar, in Distress gave the Louse many Thanks!

L. What of me, says the Louse, if I purchase all your Debts?

B. I'm for Law, says the Beggar, which will o'er Truth prevail;

L. The Law, says the Louse, will put you into God!

B. You talk like a Fellow who knows the Law not;

L. You talk like a Beggar, and behave like one S—t.

For your Canting, and Skulking, and L—g, I'll not leave you;

Pater-noster, White-washing, nor Porc—I can save you!

XVI.

XVI. Extraordinary Quere 131, answered by Casuisticus.

TO term any Thing (*natural Day* artificial, artificial natural, &c.) contrary to what is established by Custom is *misterming* it; and is of no Authority, whether of *Trismegistus* or of *C. Brent*. As terming *C. Brent* *Trismegistus*, or *Trismegistus* *C. Brent*, would create Misunderstanding and Confusion in Speech. The Term *artificial* is applied to many other Things besides to *Day*; as *artificial Lights*, *artificial Wranglers*, &c. without parrying Truth by *Necessity*. Yet (in the Defect of Language) various Terms denote the same Idea; as the same Term sometimes denotes different Ideas. See *Johnson's Diction.* for a Number of different Meanings or Ideas to one Word. And Mr. *Locke* notes the natural Defect and Abuse of Words.

Just published. Price 15s. 6d. sewed, 18s. bound. The Royal Astronomer and Navigator: Containing new Improvements in the three connected Subjects of *Astronomy*, *Chronology*, and *Navigation*, proper for every Gentleman's Library, by Land, as well as for the Use of all Gentlemen going to Sea: Being a Work of great Labour and Expence, of 436 Pages in Quarto: Some Particulars of which are a Variety of the most useful and necessary Tables, Rules, and Examples, in the three important Subjects of *Astronomy*, *Chronology*, and *Navigation*. Especially correct lunar Tables (with those of *Mayer*) for aiding the practical Method of determining the Longitude. — Also correct *Navigation Tables* for keeping a Ship's exact Reckoning at Sea, according to all the Methods of Sailing in Practice, by only adding a few Figures taken out of those Tables. — With other useful Particulars, for which the Reader is referred to the Title Page of the said elaborate Work; and also to P. 78. *Pal.* 1761.

Sold by Mr. John Millan, opposite the Admiralty; Mr. Owen, near Temple-bar; Mr. Waller, Bookseller, and Mr. Cole, Mathematical Instrument Maker, in Fleet-street; Mr. Bird, in Ave-Mary Lane; Mr. Henderson, and Mr. Brotherton, at the Royal Exchange; and Mr. G. Keith, at the Bible and Crown, in Gracechurch Street, and other eminent Booksellers in London.

*** We had not Room this Year for our worthy Correspondents Solutions to the *Ladies Diary Enigmas* and *Questions*; which we hope they will pardon, as we propose to oblige them at a more favourable Opportunity. The *Diary* Copy is ravished from us, and put into other Hands. — If these Correspondents are pleased to send their Things to us (as usual) we hope to oblige them more another Year.

The Original *Ladies Diary*, with a *French Calendar* as we proposed to publish for 1762, we must defer publishing to a more favourable Opportunity.

As we having not sufficient Subscribers for printing the Volumes of *Ladies Diary Enigmas*, *Questions*, &c. with their Answers, nor yet for publishing the *Supplemental Astronomer*, we offer to such of our worthy Subscribers as are unwilling to wait till we have a sufficient Number, our *Royal Astronomer and Navigator*, for each paying 2s. 6d. more for a sewed, and 5s. more for a bound Book. Which Compliance (instead of returning their Half-Guineas) we shall take for an Instance of their Favour and Encouragement of our expensive Works. And we hereby promise them either the *Diary Volumes* or *Supplemental Astronomer* at the Price subscribed for, whenever they are published; as they will be sold for more, like the *Royal Astronomer*. — And we cannot but acknowledge the singular Obligations and Honour done us by Capt. TYR—L in his Encouragement of our Works; whose Bravery and Conduct were so signal, on board the *Buckingham Man of War*, in the *West Indies*.

*** Our *Palladium Correspondents* are desired to send all their Letters (franked or Post paid) directed for the *Palladium Author*, at Mr. Cole's, mathematical Instrument Maker, Fleet-street, London. Of whom may be had all Sorts of the best and newest improved mathematical Instruments, Vision Glasses, &c.

To the *Strana Dunciad* Reviewer.

Once Balaam's Ass reprov'd him on the Way;

But thine, O Dick, can only kick and bray! — Mercator.

CHRO-

CHRONOLOGICAL RULES.

Perpetual TABLE, shewing, by the Sunday Letter, the Week-day to any Month-day, and the contrary, in any Year, past, present, or to come, according to N. or O. Style.

MONTHS.	Sunday Letters.						
January. October.	A	B	C	D	E	F	G
Feb. March. Nov.	D	E	F	G	A	B	C
April. July.	G	A	B	C	D	E	F
May.	B	C	D	E	F	G	A
June.	E	F	G	A	B	C	D
August.	C	D	E	F	G	A	B
Septem. Decem.	F	G	A	B	C	D	E
<i>Use.</i> Under the Sunday Letter for the Yr,	1	2	3	4	5	6	7
that stands against the	8	9	10	11	12	13	14
respective Months, on	15	16	17	18	19	20	21
the Left, are the Sun-	22	23	24	25	26	27	28
day Month-days, and	29	30	31				
the other Week-days							
to the Right and Left,							
in Order of the Co-							
lumnns.							

EXAMPLE for 1762. Sunday-Letter C, New Style.

MONTHS.	Sundays.				
January. October.	3	10	17	24	31
Feb. March. Nov.	7	14	21	28	
April. July.	4	11	18	25	
May.	2	9	16	23	30
June.	6	13	20	27	
August.	1	8	15	22	29
Septem. Decem.	5	12	19	26	

In the *Perpetual Table* on the Left, you find under the *Sunday Letter C*, standing against the several Months, all the *Sunday Month-days*, as above; whence the *Week-day* to any *Month-day*, and the *contrary*, may be determined, in the Year, by counting the Difference of Days forward or backward, from any *Sunday*.

A TABLE of the Number of Weeks and Days from any one Month-day to the same Day in any other Month, following.

Months.	Jan.	Feb.	Mar.	Apr.	May	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
	w d	w d	w d	w d	w d	w d	w d	w d	w d	w d	w d	w d
Jan.	52 1	4 3	8 3	12 6	17 1	21 4	25 6	30 2	34 5	39 0	43 3	47 5
Feb.	47 5	52 1	4 0	8 3	12 5	17 1	21 3	25 6	30 2	34 4	39 0	43 2
March.	43 5	48 1	52 1	4 3	8 5	13 1	17 3	21 6	26 2	30 4	35 0	39 2
April.	39 2	43 5	47 5	52 1	4 2	8 5	13 0	17 3	21 6	26 1	30 4	34 6
May.	35 0	39 3	43 3	47 6	52 1	4 3	8 5	13 1	17 4	21 6	26 2	30 4
June.	30 4	35 0	39 0	43 3	47 5	52 1	4 2	8 5	13 1	17 3	21 6	26 1
July.	26 2	30 5	34 5	39 1	43 3	47 6	52 1	4 3	8 6	13 1	17 4	21 6
August.	21 6	26 2	30 2	34 5	39 0	43 3	47 5	52 1	4 3	8 5	13 1	17 3
Sept.	17 3	21 6	25 6	30 2	34 4	39 0	43 2	47 5	52 1	4 2	8 5	13 0
Oct.	13 1	17 4	21 4	26 0	30 2	34 5	39 0	43 3	47 6	52 1	4 3	8 5
Novem.	8 5	13 1	17 1	21 4	25 6	30 2	34 4	39 0	43 3	47 5	52 1	4 2
Decem.	4 3	8 6	12 6	17 2	21 4	26 0	30 2	34 5	39 1	43 3	47 6	52 2

N. B. One Day must be added when *February*, in Leap-Year, comes between the two Months.

Example. To find the Number of *Weeks and Days* between *April* the 3d, 1762, and *November* the 8th following.

From *April* 3 to *November* 3 following, we find, to the Right, against *April* and under *November*, 30^w 4^d, (no *February* of Leap-year coming between) to which add 5, the 8th of *November* is beyond the 3d Day, and the Sum will be 30^w 9^d, or 31^w 2^d, required. — If the Day in *November* had been before the 3d, it must have been subtracted from the 30^w 4^d, and so for the Rest.

Chronological

Dominical Letter, N. S.	C.	Year of the Julian Period	Current
O. S.	F.	——— Olympiads	6475
Golden Number	15	——— Foundation of Rome	2537
Epaet	14	Year of Nabonassar	2514
Indiction	10	——— the Turkish Hegira	2508
Cycle of the Sun	8	——— the Gregorian Correction	1140
			180

The VARIABLE CHRONOLOGER for the present YEAR 1762.
To be compared with the *Perpetual Time-Tables* from P. 180 to 188, in the *Royal Astronomer and Navigator*; and also in *Palladium* 1758, from P. 66 to the End, Dominical Letter C.

Jan. 3. 1 Sund. aft. Christ.	Apr. 11. EASTER.	Jun. 6 Trinity Sunday.
10. 1 Sund. aft. Epiph.	18. Low Sunday.	Fr. Trin. to Adv. 25 Sund.
From Epiphany to Septuagesima 4 Sundays.	21. Ox. & Cam. T. beg.	7. Trin. Col. Elect.
Feb. 7. Septuagesima Sund.	26. 1 Ret. Easter Ter.	1 Ret. Trin. Ter.
14. Sexagesima Sund.	28. Easter Term beg.	9. Ox. & Cam. T. beg.
21. Quinquagesima, or Shrove Sunday.	May 3. 2 Return same T.	10. Corp. Christ.
24. Ash Wednesday.	12. 3 Return same T.	11. Trinity Term beg.
25. Cam Com for B.A.	Westminster Elect.	14. 2 Ret. Trin. Ter.
28. Quadragesima, or 1st Sun. in Lent.	16. Rogation Sunday.	21. 3 Ret. same Term.
Mar. 3. 5, & 6, Ember.	17. 4 Ret. Easter Ter.	28. 4 Ret. same Term.
25. Camb. latter Aft.	18. 19 Rogation Days.	30. Trinity Ter. ends.
Apr. 3. Ox. & Cam. T. end.	20. Ascension Day.	Jul. 1. Camb. Commenc.
4. Palm Sunday.	21. 5 Return same T.	8. Oxford Aft.
9. Good Friday.	24. Easter Term ends.	Sep. 15, 17, 18. Ember.
September 8 and 22	27. Ox. & Cam. T. end.	Nov. 25. Baliol Col. Elect.
	30. Whitsunday.	28. Advent Sunday.
	Jun. 2, 4, 5. Ember.	Dec. 15, 17, 18. Ember.

The ROYAL HAPPY PAIR were wed and crown'd!

Each of the above Months to be compared with each of the same Months in *Palladium* 1758, from P. 69 to the End, for all you want.

*** Our Work having been unfairly misrepresented by certain Malcontents in *Pater-noster Row*, with an Intent to suppress it, we propose (if it is suppressed) to get a *Pocket Book* published, to contain a *Calendar*, &c. to excel all *Pocket Books* hitherto known, for the Utility of its Plan. — Which may not improperly be termed, *The Gentleman and Lady's POCKET BOOK, or the City and Country DIARY*. Wherein we shall publish a *French Calendar*. (paying Stamp Duty) &c. to carry on our former Plan of the *Palladium*, to the Confusion of all *Sham Almanacs* and erroneous Calculations concerning the Sun, Moon, and Year; the Proprietors of which absurd and erroneous Productions (like the invading *Magaziners*) act on no other Principle than that of *my Son get Money*.

Corrections of the *Palladium* 1762. — *Prize Quest.* To find 3 (not 4) whole Numbers answering the 3 Conditions of the Quest. — XXVII. Quest. 229, proposed by Mrs. Anne Nichols, not by Mr. Johnson. It was transposed out of Place, and should have come under the former Question by Mrs. A. Nichols.

P. 37. l. 10. r. $\frac{1}{2}$ Quantity remaining. P. 51. l. 8. for confirming r. conforming, or blot with. P. 58. l. 28. r. Kepler 3500. P. 64. l. 14. for Visible Longitude, r. Visible Conjunction.

F I N I S.



correct

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